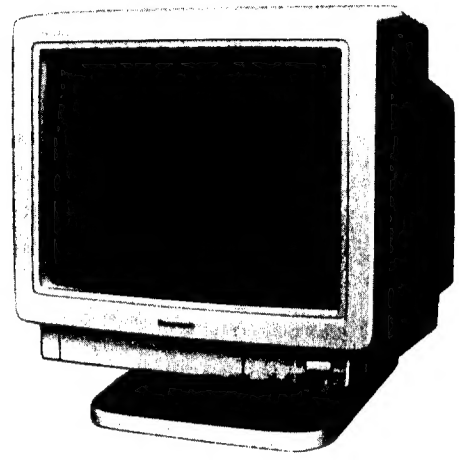
ORDER NO. KME9010170C3
G1

Service Manual

Color Computer Display

C1381

Chassis No. KMX-F407E



CONTENTS

Panasonic

Specifications are subject to change without notice.

Matsushita Electric Industrial Co., Ltd.
Central P.O. Box 288, Osaka 530-91, Japan

IMPORTANT SAFETY NOTICE

There are special components used in Panasonic Computer Display which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts be replaced with manufacturer's specified parts **only** to prevent X-RADIATION, shock, fire, or other hazards. Do not modify the original design.

ABBREVIATIONS USED IN THIS MANUAL

ITC	Integral Tube Component	**AVR**	Automatic Voltage Regulator
FET	Field Effect Transistor	**CRT**	Cathode Ray Tube
DY	Deflection Yoke	**FBT**	Flyback Transformer
CY	Convergence Yoke	**AFC**	Automatic Frequency Control
MOS	Metal Oxide Semiconductor	**VR**	Variable Resistor

SAFETY PRECAUTIONS

GENERAL GUIDELINES

1. Use an isolation transformer in the power line and AC supply to troubleshoot.
2. When servicing, observe the original lead dress, especially the lead dress in the high voltage circuits. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
3. After servicing, ensure that all the protective devices such as insulation barriers, insulation papers, shields, and isolation R-C combinations, are properly installed.
4. Before turning the display on, measure the resistance between B+ line and chassis ground. Connect ⊖ side of an ohmmeter to the B+ lines, and ⊕ side to chassis ground. Each line should have more resistance than the following specifications:

B+ Line	Minimum Resistance
5V	370k Ω
12V	164 Ω
15V	330k Ω
20V	680 Ω
25V	14k Ω
100V	4k Ω

5. Potentials, as high as 24.5 kV are present when this display is in operation. Operation of the display without the rear cover involves the danger of a shock hazard from the display power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment. Always discharge the anode of the picture tube to the display chassis before handling the tube.
6. After servicing, perform the leakage current checks to prevent the customer from being exposed to shock hazards.

LEAKAGE CURRENT COLD CHECK

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Turn on the display power switch.
3. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the display, such as screwheads, terminals, control shafts, handle bracket, etc. When an exposed metallic part has a return path to the chassis, the reading should be between 240 kΩ and 5.2 MΩ.
   When exposed metal does not have a return path to the chassis, the reading must be ∞.

LEAKAGE CURRENT HOT CHECK (See figure 1.)

1. Plug the AC cord into the AC outlet. DO NOT use an isolation transformer for this check.
2. Connect a 1.5 kΩ, 10 watts resistor, in parallel with a 0.15 μF capacitor, between each exposed metallic part on the set and a good earth ground such as a water pipe, as shown in figure 1.

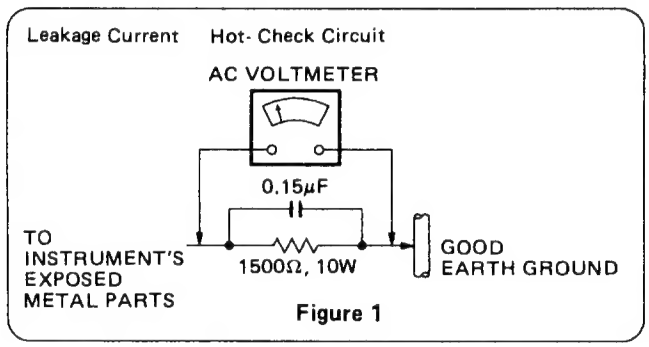


Figure 1

3. Use an AC voltmeter, with 1000 ohms/volt or more sensitivity, to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the polarity of the AC plug in the AC outlet and repeat the above measurements.
6. The potential at any point should not exceed 0.75 volt RMS. A leakage current tester (Simpson Model 229 or equivalent) may be used to make the hot checks.
   Leakage current must not exceed 0.5 milliamp. If a measurement is outside of the specified limit, there is a possibility of a shock hazard, and the monitor should be repaired and rechecked before it is returned to the customer.

X-RADIATION

WARNING: 1. The potential source of X-Radiation in the display is the high voltage section and the picture tube.
2. When using a picture tube test jig for service, ensure the jig is capable of handling 26.0kV without causing X-Radiation.

NOTE: It is important to use an accurate, periodically calibrated high voltage meter.

1. Slide the Brightness control to minimum.
2. Measure the high voltage. The meter reading should indicate 24.5 kV ± 0.5 kV. If the meter indication is out of tolerance, immediate service and correction is required to prevent the possibility of premature component failure.
3. To prevent an X-Radiation possibility, it is essential to use the specified picture tube.

HORIZONTAL OSC. DISABLE CIRCUIT TEST

WARNING: This test must be made as a final check before the set is returned to the customer.

1. With rear cover removed, supply nominal 220V AC and connect a host computer to the set.
2. Turn on the power switch and adjust the monitor controls to the normal position.
3. Supply a full screen of "H" characters from the host computer.
4. Turn R826 (B+ Adj.) fully counterclockwise.
5. Connect a short jumper between TP503 and ground.
6. Turn R826 (B+ Adj.) slowly clockwise.
7. Confirm that the picture falls out of horizontal sync.
8. If the test fails, the Horizontal Osc. Disable Circuit is not operating and must be repaired.
   Refer to the Horizontal Oscillator Disable Circuit Repair Procedure.
9. After confirmation of this Test, remove the short jumper and readjust B+ voltage to 100V.
   This circuit must be operative before the set is returned to the customer.

HORIZONTAL OSC. DISABLE CIRCUIT REPAIR PROCEDURE

1. Connect a DC voltmeter between the cathode of D553 and chassis ground of the main board. If approximately 13.6V is not present on the anode, find the cause.
   Check D553 and R534.
2. Connect a DC voltmeter between the cathode of D555 and chassis ground of the main board. If approximately 13V is not present on the cathode, find the cause.
   Check R566, R567, C560, D553 and R534.
3. Repeat step 2 procedure. If approximately 13V is present on the cathode, check D555, and IC5002.
4. When the circuit is repaired, perform the horizontal oscillator disable circit test again.

CONTROL LOCATIONS AND OPERATIONS

CONTROL LOCATIONS

(Front View)

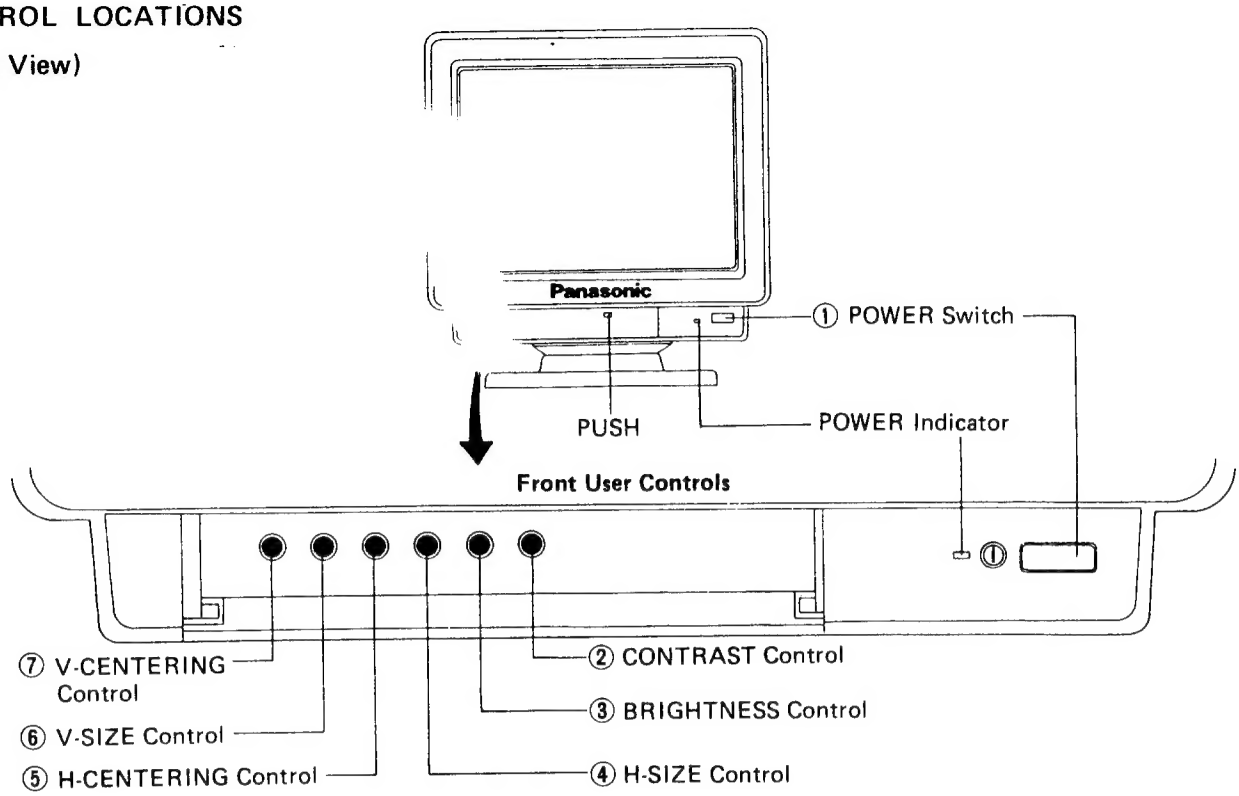


Figure 2

(Rear View)

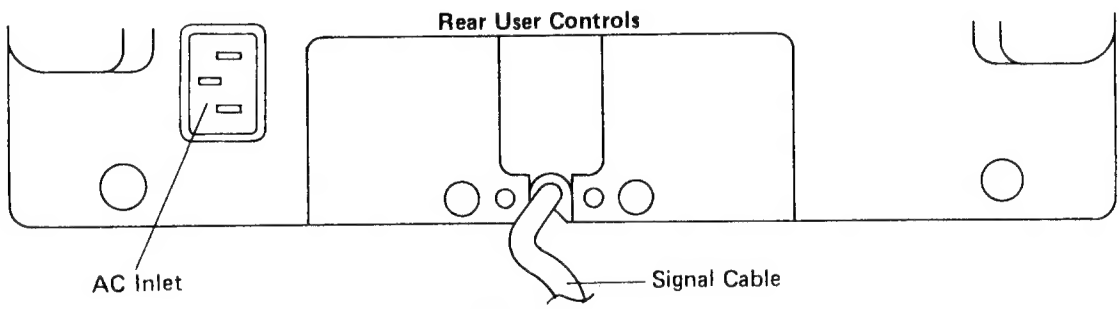


Figure 3

OPERATIONS

① POWER Switch	Push to turn the display on, and push again to turn the display off. When the display is on, the power indicator lights.
② CONTRAST Control	Adjust the display for proper contrast level. (White level)
③ BRIGHTNESS Control	Adjust the display for proper brightness level. (Black level)
④ H-SIZE Control	Adjust the display for proper horizontal size. This control has a click position which gives the proper horizontal size for IBM personal computer standard video boards.
⑤ H-CENTERING Control	Adjust the display for proper horizontal position. This control has a click position which gives the proper horizontal position for IBM personal computer standard video boards.
⑥ V-SIZE Control	Adjust the display for proper vertical size. This control has a click position which gives the proper vertical size for IBM personal computer standard video boards.
⑦ V-CENTERING Control	Adjust the display for proper vertical position. This control has a click position which gives the proper vertical position for IBM personal computer standard video boards.

SPECIFICATIONS

1. SCOPE

The purpose of this specification is to describe the cabinet type color display, which is a Multi Scan Rate type.

2. MECHANICAL DESCRIPTION

2-1. Dimensions

Width:	13.9 in. (354 mm)
Depth:	14.8 in. (375 mm)
Height:	14.4 in. (366.5 mm)

2-2. Weight

Monitor only:	25.3 lbs (11.5 kg)
Monitor packaged for shipment:	28.2 lbs (12.8 kg)

3. CONSTRUCTION

3-1. Outline

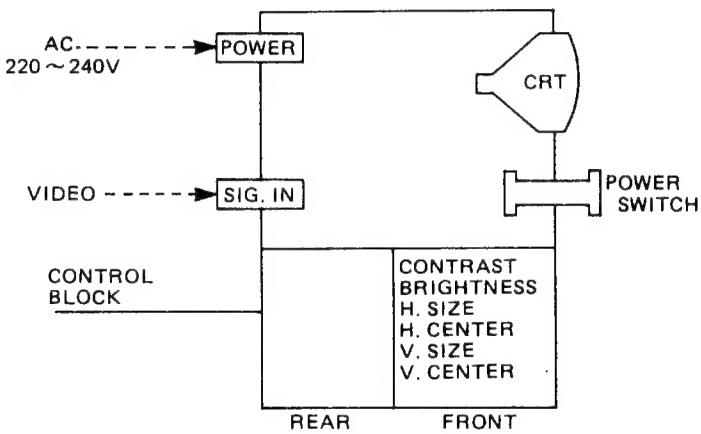


Figure 4

3-2. CRT Characteristics

Size:	14 inch diagonal (13 inch visual)
Matrix:	Black opaque matrix
Matrix type:	Negative guard band
Faceplate type:	Non-glare surface, Tinted screen glass
CRT part No.	PAWD1C1381H*
Phosphor:	P22
Persistance:	Short
Array:	Triangular dot trios
Trio pitch:	0.28 mm typ. at center

* This No. (PAWD1C1381H) is ITC NO..
CRT is supplied as ITC.
ITC = Integral Tube Component
(CRT with DY and CY)

4. ENVIRONMENTAL CHARACTERISTICS

4-1. Temperature, Humidity and Altitude

4-1-1. Operating Conditions

Temperature:	+32°F ~ +104°F (0°C ~ +40°C)
Humidity:	5 ~ 90% (no condensation)
Altitude:	10,000 Feet max. (3.048m max.)

4-1-2. Non-Operating Conditions

Temperature:	−40°F ~ −149°F (−40°C ~ +65°C)
Humidity:	5 ~ 90% (no condensation)
Altitude:	40,000 Feet max. (12.192m max.)

4-1-3. Storage and Shipment

Temperature:	−40°F ~ +149°F (−40°C ~ +65°C)
Humidity:	5 ~ 95% (no condensation)
Altitude:	40,000 Feet max. (12.192m max.)

4-2. Vibration and Shock (Packaged Condition)

4-2-1. Vibration

Frequency:	5 ~ 50 Hz (Sweep cycle 810 seconds)
Length of time for testing:	Vertical ..... 40 min. Horizontal ..... 40 min. (Front and Rear ..... 20 min. Right and Left ..... 20 min.)
Acceleration of vibration:	Vertical ..... 1.00G Horizontal 0.5G

4-2-2. Shock

Corner and edge:	Height: 19.69 in.(50 cm)
Front, back side and bottom:	Height; 23.62 in.(60 cm)
	Shock is given to corner, edge, front, back side and bottom 10 times each.

5. ELECTRIC PERFORMANCE

5-1. Power Supply

Input voltage:	180 ~ 264V AC
Input frequency:	50 Hz
Input current:	0.7A max. (at 230V AC)
Power:	95W max. (at 230V AC)
Surge current:	80A max. (at 230V AC)

5-2. Input Signals

5-2-1. Video Signal

Polarity: Positive

Signal level: Analog 0.7Vp-p/75 ohm

5-2-2. Horizontal Synchronization Signal

Polarity: Positive/Negative

Signal level: TTL level separate sync

Frequency: 30 kHz to 37 kHz continuous. Auto size and center at 31.5 kHz, 35.2 kHz VGA/SVGA/8514A standards.

5-2-3. Vertical Synchronization Signal

Polarity: Positive/Negative

Signal level: TTL level separate sync

Frequency: 50 Hz to 90 Hz continuous. Non Interlaced or Interlaced modes. Auto size and center for VGA/SVGA/8514A standards.

Note: The monitor detects vertical & horizontal sync polarity and automatically select its polarity and frequency.

5-3. Signal Timing

See figures on page 8.

5-4. Video Output

Amplifier response

The video amplifier produces a drive signal at the cathodes of the CRT of sufficient amplitude to produce a spot luminance with rise and fall times of less than 12 nsec. from 10% to 90% pulsed level.

(Cathode voltage is 30Vp-p./Signal source is 75 ohm impedance and oscilloscope impedance is 5pF, 1M ohm.)

6. OPTICAL CHARACTERISTICS

6-1. Image Test Condition

Character: All "H" character

Color: White

Brightness control: Max.(without background)

Contrast control: Max.

View direction: Parallel to the CRT axis

Ambient temperature: Room temperature

Supply voltage: 220V AC, 50 Hz

Terrestrial magnetism: Horizontal field...0.0 Gauss

Vertical field..... 0.2 Gauss

Note: All measurements shall be made under normal conditions after an initial warm-up time of 20 minutes.

Note: A normal condition is when the monitor produces the desired test image.

(The conditions of the items are normal unless otherwise stated.)

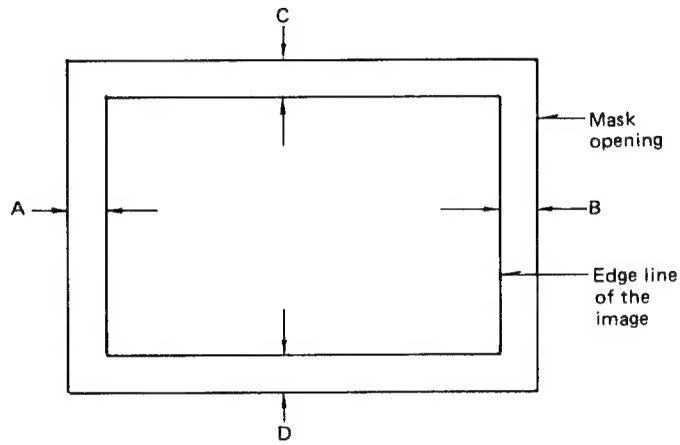
6-2. Image

6-2-1. Image size

Horizontal: 9.65 ± 0.39 in. (245 ± 10 mm)

Vertical: 7.20 ± 0.28 in. (183 ± 7 mm)

6-2-2. Image position



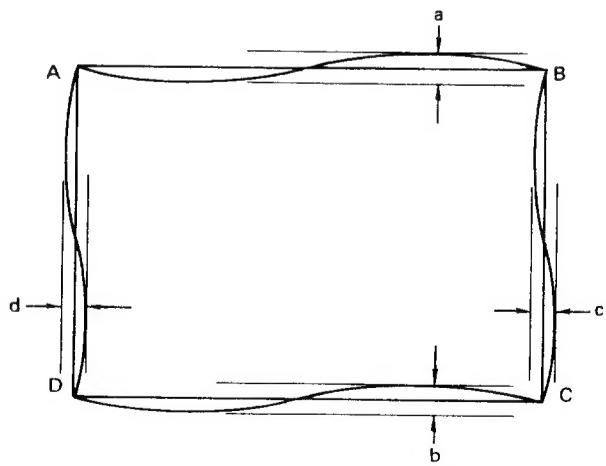
$|A - B| \leqq 0.236$ in. (6 mm)

$|C - D| \leqq 0.236$ in. (6 mm)

Figure 5 Image Position

6-2-3. Distortion

(A) Pincushion



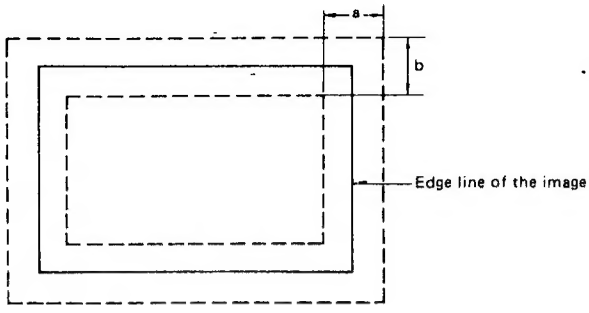
$a, b \leqq 0.098$ in. (2.5 mm)

$c, d \leqq 0.098$ in. (2.5 mm)

Input signal is a crosshatch pattern.

Figure 6 Pincushion Error

(B) Rectangularness & Parallelogram Distortion



a ..... 0.118 in. (3 mm)
b ..... 0.118 in. (3 mm)
Input signal is a crosshatch pattern.

Figure 7 Parallelogram Distortion

(C) Linearity

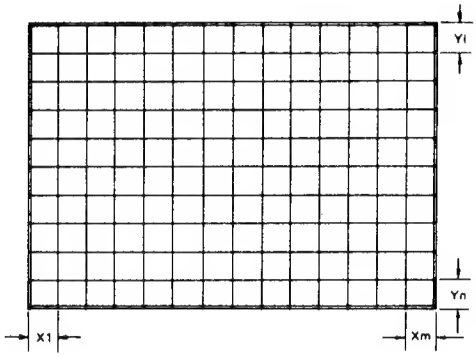


Figure 8 Linearity

$$\text{HORIZONTAL LINEARITY} = \frac{X\,(MAX.) - X\,(MIN.)}{X\,(MAX.) + X\,(MIN.)} \times 100\,(\%) \leqq 7.5\%$$

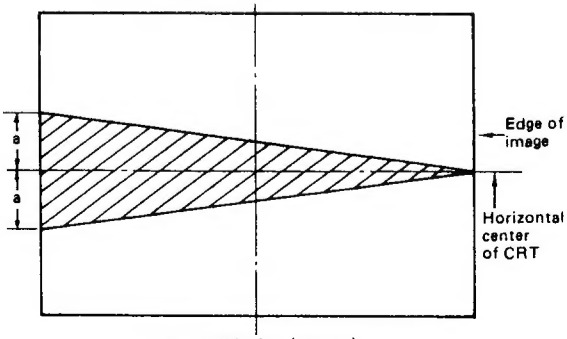
$$\text{VERTICAL LINEARITY} = \frac{Y\,(MAX.) - Y\,(MIN.)}{Y\,(MAX.) + Y\,(MIN.)} \times 100\,(\%) \leqq 7.5\%$$

Maximum and minimum value should not be adjacent to each other.

X (MAX.) = Maximum distance between vertical lines from X1 to Xm.
X (MIN.) = Minimum distance between vertical lines from X1 to Xm.
Y (MAX.) = Maximum distance between horizontal lines from Y1 to Yn.
Y (MIN.) = Minimum distance between horizontal lines from Y1 to Yn.

(D) Rotation

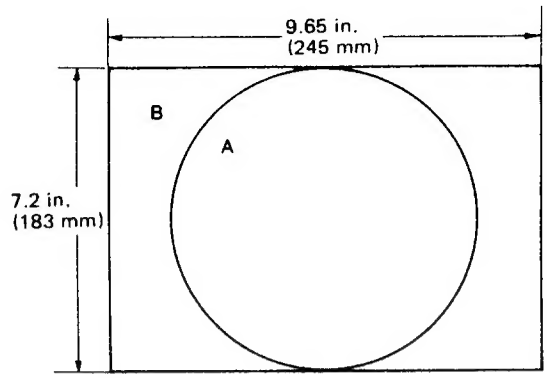
Horizontal line of the image shall be within the shaded area.



a = 0.079 in. (2 mm)
Input signal is a crosshatch pattern.

Figure 9 Rotation

(E) Convergence



area A ≦ 0.0118 in. (0.3 mm)
area B ≦ 0.0236 in. (0.6 mm)

Figure 10 Mis-Convergence

Note: Should be measured under the following conditions.

1) Terrestrial magnetism without horizontal field (0 Gauss). With vertical field of 0.2 Gauss.
2) At room temperature
3) Input signal: Crosshatch R, G, B mixed colors.

6-3. Image Size Variation

Notes and test conditions	Image size variation from the normal image size.
Rotation of brightness control	Within ± 0.118 in. (± 3m) (Horizontal and Vertical)
AC line voltage varied 220 to 240 volts	Within ± 0.157 in. (± 4 mm) (Horizontal and Vertical)
External ambient temperature varied 20 ± 20°C	Within ± 0.157 in. (± 4 mm) (Horizontal and Vertical)

Testing condition is normal condition.

7. OVERALL PERFORMANCE

7-1. Resolution

Horizontal ..... 1024 Pixels
Vertical ..... 768 Pixels

7-2. Insulation

More than 100 MΩ
Between AC line and chassis.

7-3. Jitter

Less than 1 dot
Invisible at a distance of 18 in. (45.7 cm) from CRT surface

8. CONNECTOR

8-1. Signal Connector

15 pin mini D-SUB type connector (interface cable)

※ TIMING CHART

Horizontal Sync Timing

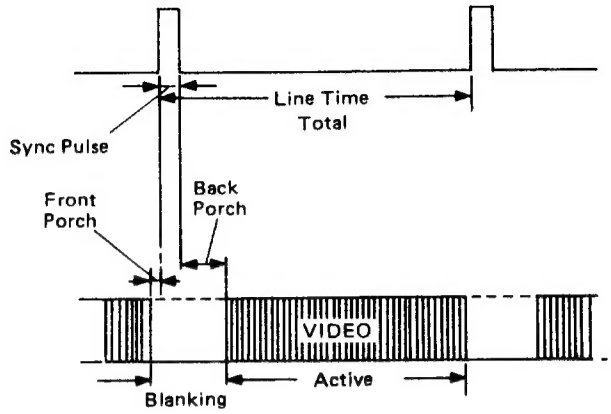
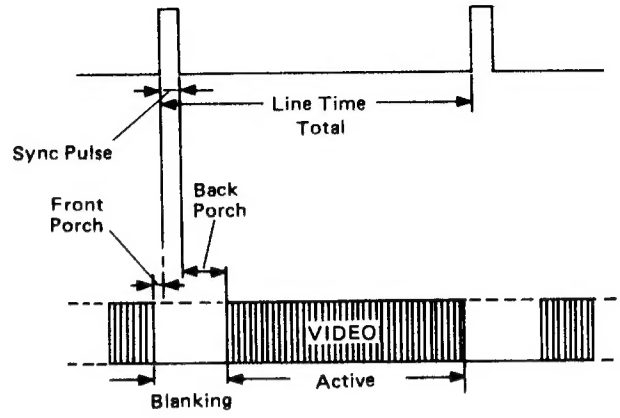


Figure 11

Vertical Sync Timing



NOTE: Scanning mode : Non-Interlaced or Interlaced.

Figure 12

Standard Signal Timing (Preset Timing)

There shall be preset timing for 8514/A, SVGA and VGA.

	8514/A	SVGA
Pixel period	22.0 ns	27.8 ns
Pixel Rate	44.90 MHz (Interlaced)	36.0 MHz
Horizontal Frequency	35.52 kHz	35.16 kHz
Line Time Total	28.15 μs	28.44 μs
Active	22.80 μs	22.22 μs
Blanking	5.35 μs	6.23 μs
Front Porch	0.18 μs	0.67 μs
Sync Pulse	3.92 μs	2.00 μs
Back Porch	1.25 μs	3.56 μs
Vertical Frequency	86.96 Hz (Field Frequency)	56.24 Hz
Frame Time Total	23.0 ms	17.78 ms
Active	10.81 ms	17.07 ms
Blanking	0.69 ms	0.72 ms
Front Porch	0.014 ms	0.03 ms
Sync Pulse	0.1126 ms	0.06 ms
Back Porch	0.564 ms	0.63 ms
Active Dots (H x V)	1024 x 768	800 x 600

	IBM PS/2 (VGA)		
	Mode 1	**Mode 2**	**Mode 3**
Pixel Period	35.30 ns	35.30 ns	39.70 ns
Pixel Rate	28.32 MHz	28.32 MHz	25.176 MHz
Horizontal Frequency	31.47 kHz	31.47 kHz	31.47 kHz
Line Time Total	31.78 μs	31.78 μs	31.78 μs
Active	25.42 μs	25.42 μs	25.42 μs
Blanking	6.36 μs	6.36 μs	6.36 μs
Front Porch	0.64 μs	0.64 μs	0.64 μs
Sync Pulse	3.81 μs	3.81 μs	3.81 μs
Back Porch	1.91 μs	1.91 μs	1.91 μs
Vertical Frequency	70.08 Hz	70.08 Hz	59.95 Hz
Frame Time Total	14.27 ms	14.27 ms	16.68 ms
Active	11.12 ms	12.71 ms	15.25 ms
Blanking	3.147 ms	1.557 ms	1.431 ms
Front Porch	1.176 ms	0.381 ms	0.318 ms
Sync Pulse	0.064 ms	0.064 ms	0.064 ms
Back Porch	1.907 ms	1.112 ms	1.049 ms
Active Dots	640 x 350	640 x 400	640 x 480

Signal Timing for Apple MAC II

	Apple MAC II*
Pixel Period	33.1 ns
Pixel Rate	30.21 MHz
Horizontal Frequency	35.00 kHz
Line Time Total	28.571 μs
Active	21.164 μs
Blanking	7.407 μs
Front Porch	2.116 μs
Sync Pulse	2.116 μs
Back Porch	3.175 μs
Vertical Frequency	66.67 Hz
Frame Time Total	15.000 ms
Active	13.714 ms
Blanking	1.286 ms
Front Porch	0.086 ms
Sync Pulse	0.086 ms
Back Porch	1.114 ms
Active Dots	640 x 480

* H/V composite sync

* When the Apple MACII is used, adjust H-Size and V-Size to proper size (approximately 236mm x 176mm) by H-SIZE control (R514) and V-SIZE control (R445).

NOTE 1: C1381 is not auto sized and centered when used with Apple MACII.

NOTE 2: When Apple MAC II is used, an optional 15P-15P mini adaptor (C81M2) is needed.

DISASSEMBLY INSTRUCTIONS

1. Pedestal Removal

a) Turn the unit rear side down with pedestal towards the front. (Figure 13)
b) Remove 2 screws Ⓐ from the swivel. (Figure 13)
c) Slide the swivel down. (Figure 14)
d) Turn the swivel 135° counter-clockwise. (Figure 14)
e) Slide the swivel up. (Figure 15)
f) Turn the swivel 45° counter-clockwise. (Figure 15)
g) Slide the swivel down and remove it. (Figure 16)
h) Remove 3 screws Ⓑ from the pedestal. (Figure 17)

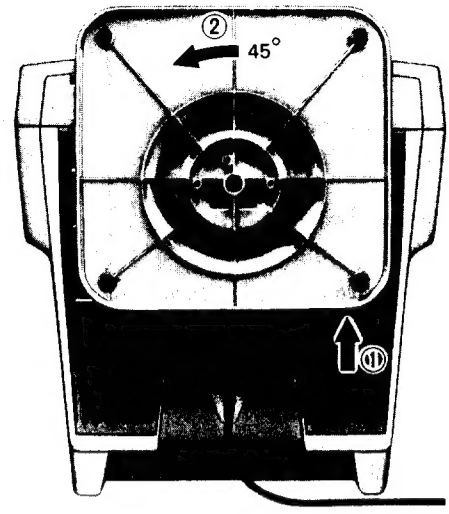


Figure 15

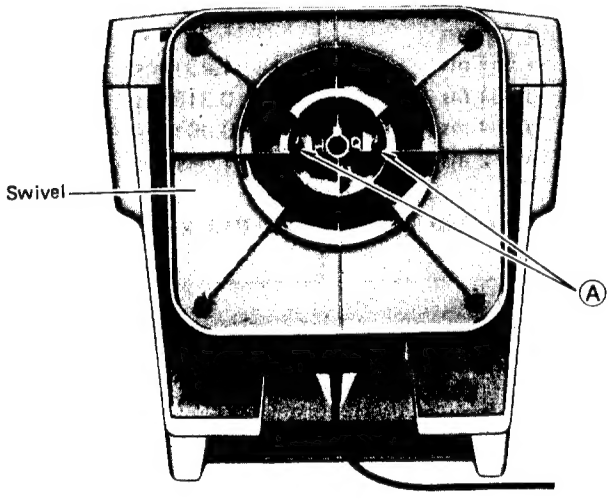


Figure 13

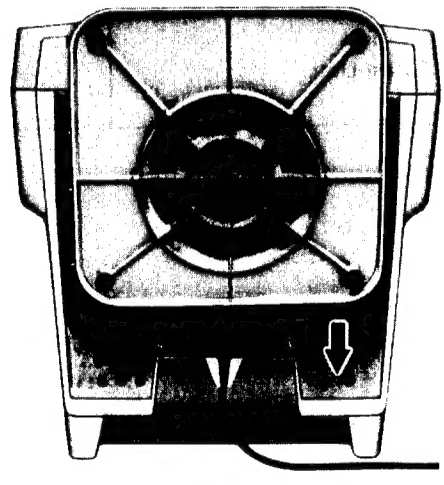


Figure 16

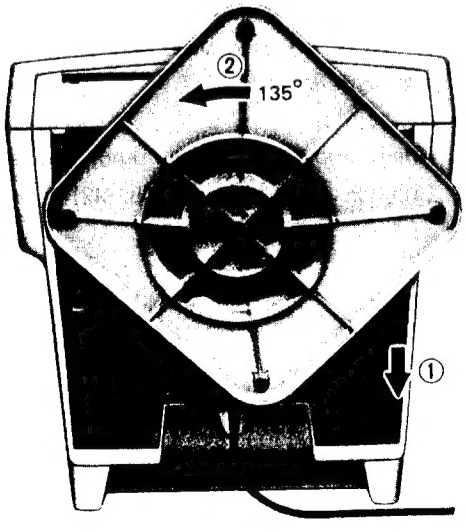


Figure 14

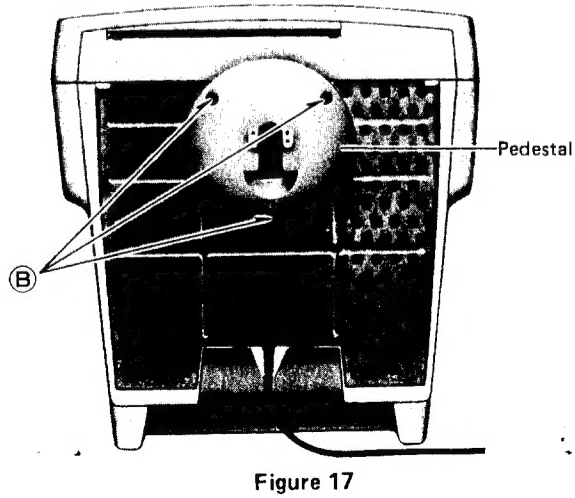


Figure 17

2. Back Cabinet Removal

a) Remove 4 screws Ⓒ and 3 screws Ⓓ from the back cabinet.

b) Remove the back cabinet.

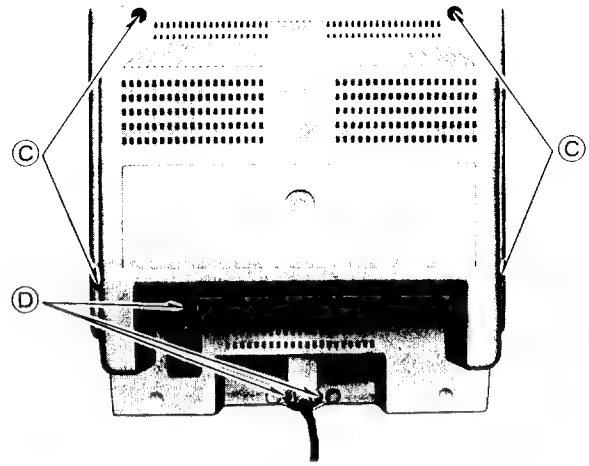


Figure 18

3. PWB Assembly Removal

Caution: When servicing or replacing the CRT, disconnect the anode and discharge the anode completely, as high voltage (24.5kV) may remain on the anode for an extended time after power off.

a) Unplug the neck board (C-board) from the CRT neck.

b) Unplug the DY connector, AC switch connector, degaussing coil connector from the main board (A-board).

c) Unplug connectors CO-2C, CO-4C, CO-6C and CO-7C from the neck board (C-Board).

d) Discharge the remaining static electricity by shorting between anode and the CRT frame ground.

e) Disconnect the anode spring from the CRT.

f) Remove 2 screws Ⓔ and 2 screws Ⓕ from signal cable bracket.

g) Remove 1 screw Ⓖ from the base frame to remove GND wires.

h) Remove 1 screw Ⓗ from the base frame to remove AC cord GND wire.

i) Remove 2 screws Ⓘ from the base frame to remove the GND wire of the CRT.

j) Remove 2 screws Ⓙ from the AC Inlet bracket.

k) Remove 2 screws Ⓚ from the AC Inlet.

(To remove the AC Inlet, unsolder A103, A104 terminals on the main baord (A-board).)

l) Remove 4 screws Ⓛ from the main board (A-board).

m) Remove the main board (A-board) together with the neck board (C-board) from the base frame.

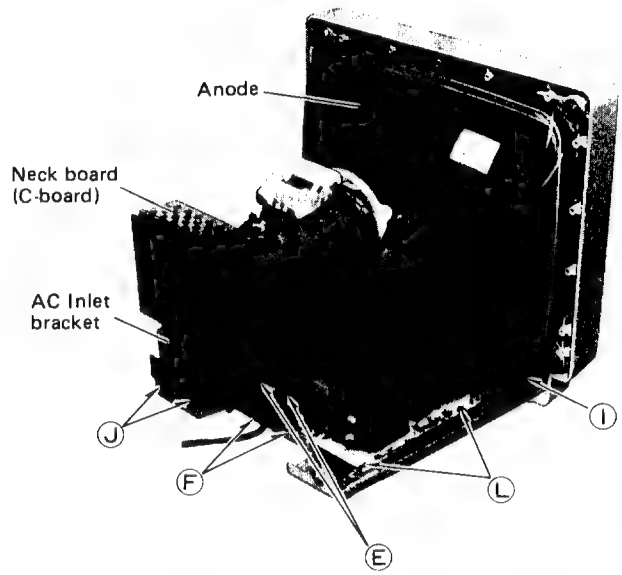


Figure 19

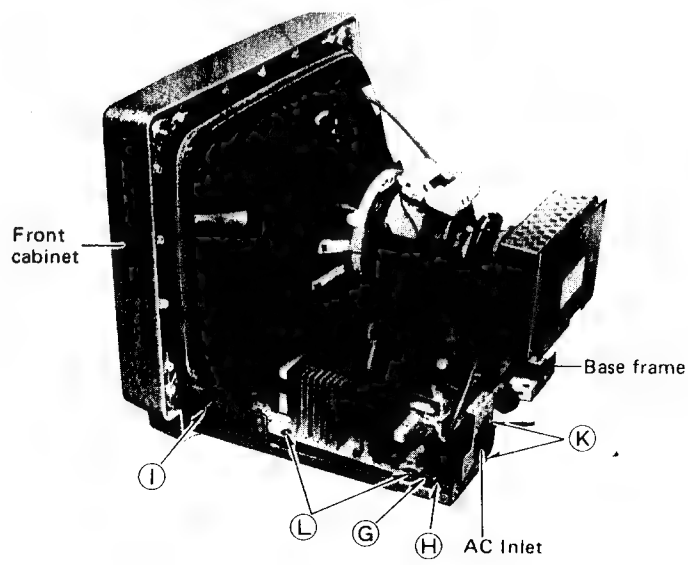


Figure 20

5. AC Switch Removal

a) Remove 2 screws Ⓜ from the base frame to separate it from the front cabinet.
b) Remove the AC switch button from the AC switch.
c) Remove 1 screw Ⓝ.
d) Remove the AC switch from base frame.

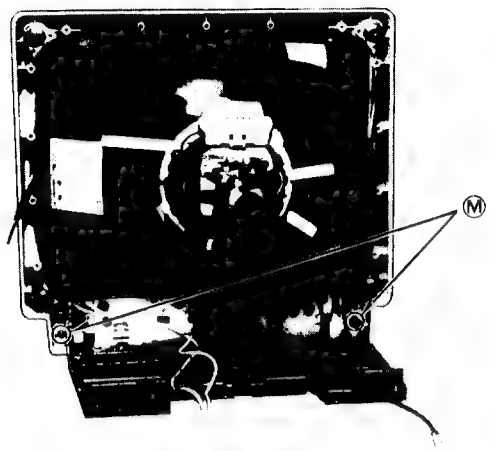


Figure 21

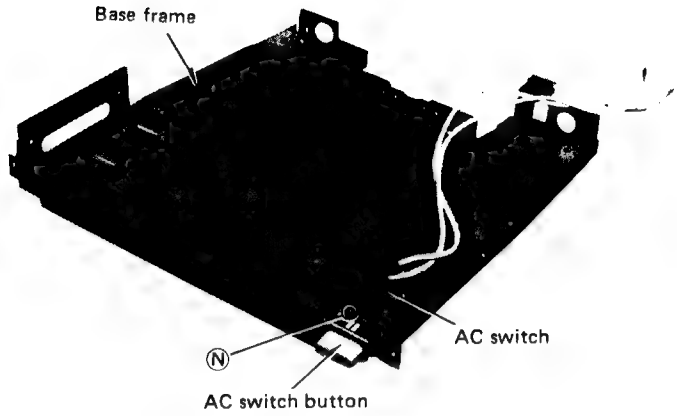


Figure 22

6. CRT Removal

* CRT is supplied as ITC.
a) Remove 4 screws Ⓞ from the front cabinet.
b) Remove the CRT from the front cabinet.
Caution: Do not lift the CRT by the neck.

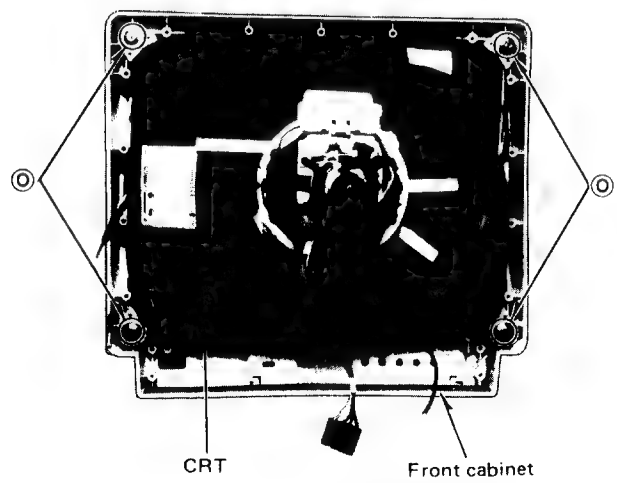


Figure 23

GENERAL CONNECTION & APPLICATIONS

Pin connection of cable adaptor for personal computer with 15 pin output terminal

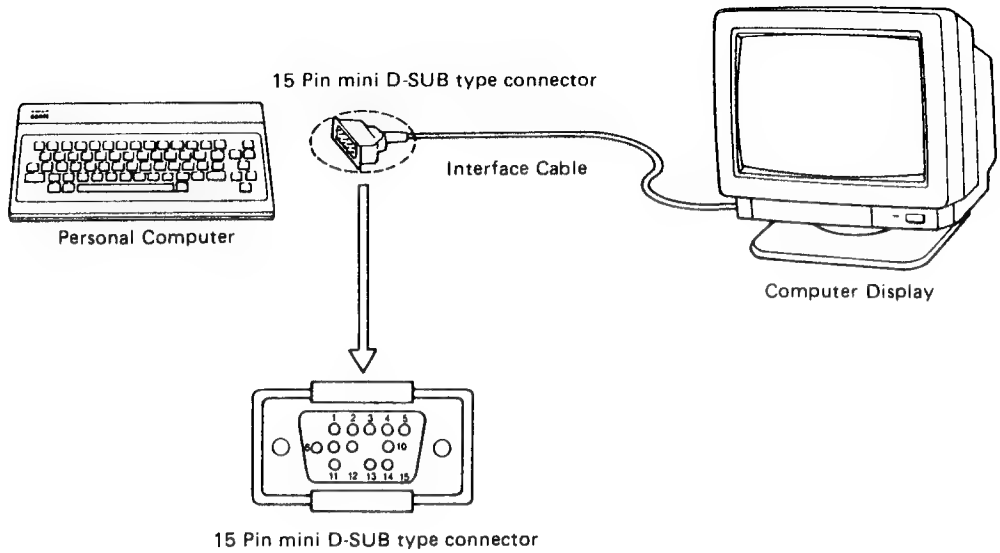


Figure 24

Pin Assignments for IBM Graphics Adaptors

Pin No.	Signals	Remarks
1	Red	
2	Green	
3	Blue	
4	Ground	
5	Ground	
6	Red Ground	
7	Green Ground	
8	Blue Ground	
9	Key	N. C.
10	Ground	
11	M. Sense 0	Ground
12	M. Sense 1	N. C.
13	Horizontal Sync.	
14	Vertical Sync.	
15	Reserved	N. C.

ELECTRONIC CIRCUIT DESCRIPTION

- **Over Voltage Protection Circuit**

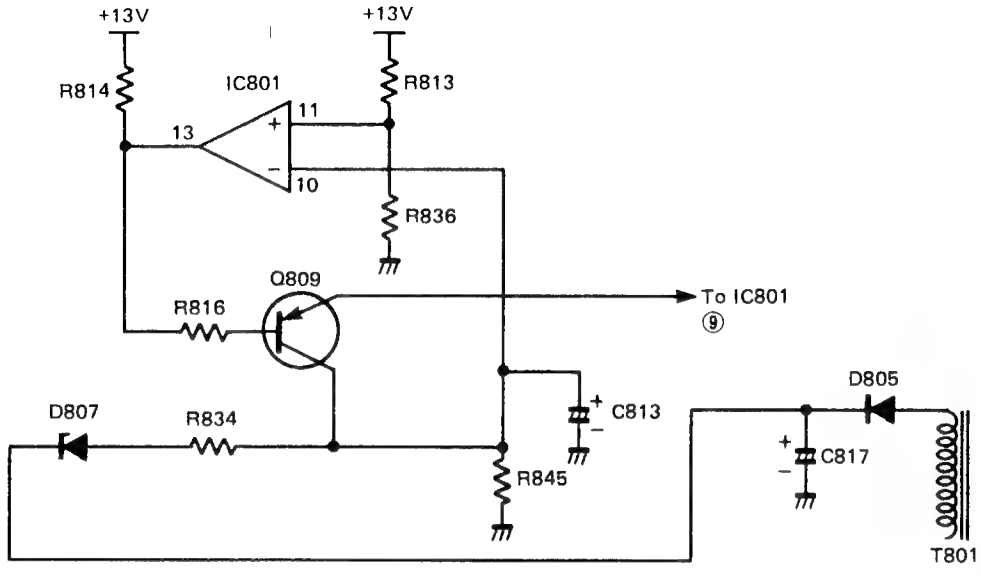


Figure 25

a. According to the change of secondary output voltage, the output voltage of D805 changes.
b. When the secondary output voltage increases abnormally, the equivalent voltage to the change is detected from D805, and D807 conducts.
   As a result the pin 10 voltage of IC801 increases.
c. When the pin 10 voltage of IC801 increases and exceeds the reference voltage, the comparator turns on and the Q809 base voltage decreases.
d. By the decrease of Q809 base voltage, the emitter current increases causing the pin 9 voltage of IC801 to decrease.
e. By decreasing the pin 9 voltage of IC801, the pulse width of pin 14 becomes too narrow.
f. By this operation, the secondary output voltage decreases.

- **Horizontal Osc. Disable Circuit**

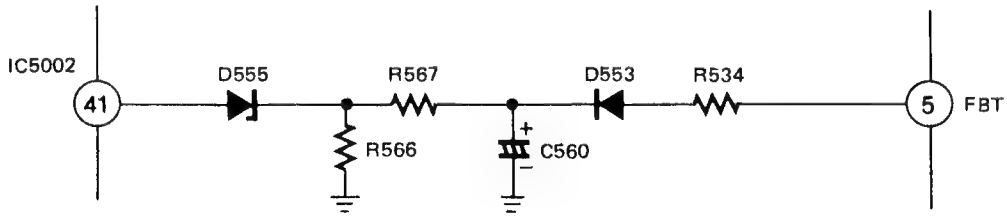


Figure 26

a. A pulse from the FBT is rectified and smoothed by D553 and C560. R567 and R566 share the voltage drop.
b. If the high voltage rises, the shared voltage rises and turns D555 on.
   By this, horizontal osc. disable circuit in IC5002 turs on.
c. Result of this, the frequency of the horizontal osc. rises and it works to decrease the high voltage.

ADJUSTMENT

Service Adjustment Control Locations

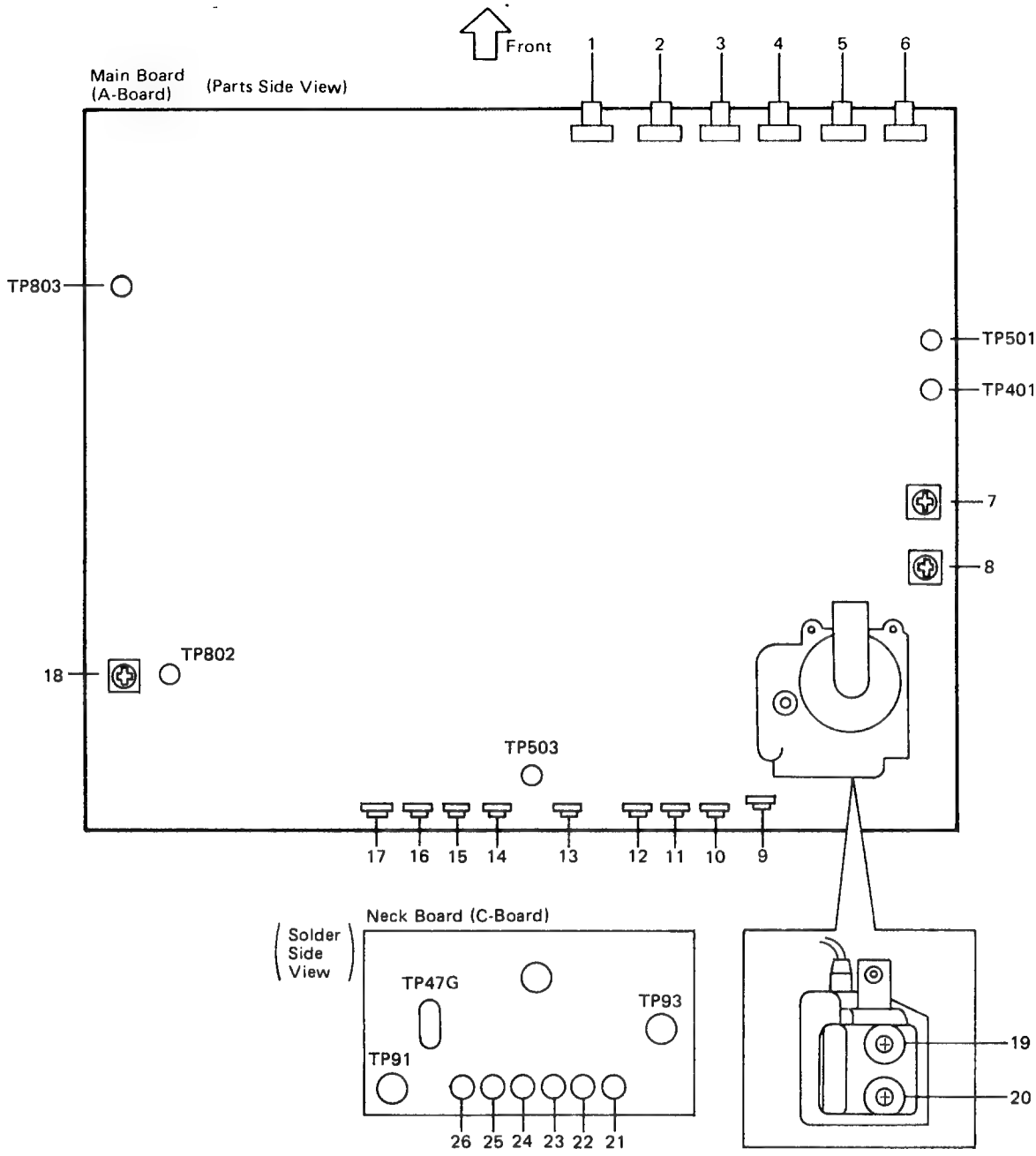


Figure 27

1 ..... CONTRAST (R3115)
2 ..... BRIGHT (R3116)
3 ..... H. SIZE (R514)
4 ..... H. CENT. (R515)
5 ..... V. SIZE (R445)
6 ..... V. CENT. (R444)
7 ..... H. H. HIGH (35 kHz) (R502)
8 ..... H. H. LOW (31 kHz) (R525)
9 ..... V. CENT. PRE. (R4060)
10 ..... SUB. V. SIZE (R408)
11 ..... V. LIN. (R416)
12 ..... H. V. ADJ. (R577)
13 ..... PINCUSHION (R456)
14 ..... H. SIZE PRE. (R512)
15 ..... H. CENT. PRE (R5015)
16 ..... SUB. CONT. (R3124)
17 ..... SUB. BRIGHT (R3126)
18 ..... B+ ADJ. (R826)
19 ..... FOCUS
20 ..... SCREEN
21 ..... VIDEO-BIAS (R3580)
22 ..... B-DRIVE (R3503)
23 ..... R-DRIVE (R3501)
24 ..... B-CUT OFF (R3512)
25 ..... R-CUT OFF (R3510)
26 ..... G-CUT OFF (R3511)

Unit Condition:
- AC 220V, 50 Hz
- VGA and SVGA Signals

Test Points and Service Adjustment Controls:
Refer to page 15.

Test Equipment:
- Oscilloscope
- Digital Voltmeter
- Frequency Counter
- H. Frequency Detective Coil
- High Voltmeter
- Digital Photometer

1. Power Supply

1-1. B+ Voltage Output Adjustment

(See B-4 of Page 31)

a) Apply a VGA signal to the unit.
b) Apply 220V AC to the unit.
c) Connect a digital voltmeter between TP91 and ground.
d) Turn the unit on.
e) Adjust R826 (B+ ADJ.) to 99V ± 1.5V.
f) Vary the AC input voltage from 220V to 240V and confirm the voltage is 99V ± 1.5V.
g) Apply the normal AC voltage (220V AC) to the unit.
h) Confirm the voltage across C852 is 15.0V ± 0.5V.
i) Confirm the voltage across C858 is 27.0V ± 0.2V.
j) Confirm the voltage between D5003 anode and cathode is 5V ± 0.3V.
k) Confirm the voltage across IC504 pin 3 and ground is 12V ± 0.5V.
l) Confirm the voltage across D558 is 20V ± 1V.

1-2. Confirmation of Protection Circuit

(See A-5 of Page 31)

a) Apply a VGA signal and 220V AC to the unit.
b) Apply exterior DC voltage to D805 cathode.
c) Connect a digital voltmeter between D805 cathode and ground.
d) Turn the AC switch on and confirm that the unit is receiving the VGA signal.
e) Raise the exterior DC voltage up to 30V and confirm that the unit stops operating.

2. H-Hold Tracking Adjustment

2-1. Preparations

(See C-3 of Page 31)

Connect a short jumper between TP501 and ground to make horizontal frequency in a free run condition.

2-2. H-Hold 31 kHz Adjustment

(See C-4 of Page 31)

a) Apply a VGA signal to the unit.
b) Turn R515 (H. CENT.) to set click position.
c) Adjust R525 (H.H. LOW) until horizontal movement stops.

2-3. H-Hold 35 kHz Adjustment

(See C-4 of Page 31)

a) Apply a SVGA signal to the unit.
b) Adjust R502 (H.H. HIGH) until horizontal movement stops.

3. High Voltage Adjustment

(See E-5 of Page 31)

a) Apply a VGA signal with crosshatch pattern.
b) Turn R3116 (BRIGHT) and R3115 (CONTRAST) controls fully clockwise.
c) Apply 220V AC to the unit.
d) To measure the high voltage, use a high impedance high voltmeter, connect (–) to chassis and (+) to the CRT anode contact.
e) Adjust R577 (H.V. ADJ.) to set the high voltmeter to 24.5 kV ± 0.2 kV.

Warning: After adjusting R577 (H.V. ADJUST), cover the control VR with UL tube and fill with silicon rubber so the VR is not turned.

4. Sub Contrast Adjustment

(See A-3 of Page 31)

a) Apply 220V AC to the unit.
b) Apply a VGA signal with white pattern to the unit.
c) Fully turn screen control of FBT counterclockwise.
d) Turn R3116 (BRIGHT) and R3115 (CONTRAST) controls fully clockwise.
e) Connect a oscilloscope between TP47G and ground.
f) Adjust R3124 (SUB.CONT.) to set the oscilloscope 42V ± 1.0Vp-p.

5. Video Bias Adjustment

(See D-1 of Page 31)

a) Apply 220V AC to the unit.
b) Apply a VGA signal with black pattern to the unit.
c) Turn R3116 (BRIGHT) and R3115 (CONTRAST) controls fully clockwise.
d) Turn R3511 (G. CUT OFF) to center position.
e) Connect a digital voltmeter between TP47G and ground.
f) Adjust R3580 (VIDEO BIAS) to set the voltmeter at 70V.

6. White Balance Adjustment

(See D-1, C-3, E-1, E-2 of Page 31)

a) After adjusting VIDEO BIAS, adjust Bright control (R3116) to set the voltmeter 75V ± 1V.
b) Connect GND and TP401 with short wire.
c) Slowly turn the screen control clockwise until a dim green horizontal line appears on the picture tube.
d) Make the horizontal line white by turning R3510 (R-CUT OFF) and R3512 (B-CUT OFF).
e) Remove the short wire connected at step (b).
f) Apply a full white field signal to the unit.
g) Turn Bright control (R3116) and Contrast control (R3115) fully clockwise.
h) Adjust R3501 (R-DRIVE) and R3503 (B-DRIVE) to produce a normal white pattern.
i) Check that the uniform white pattern is achieved from low brightness to high brightness levels. Proper tracking at all brightness levels can be obtained when the screen control, cutoff controls and drive controls are properly adjusted. If the results are unsatisfactory, repeat all the above steps.

X = 0.284 (± 0.01 at 25 ft-L, ± 0.01 at 3 ft-L)
Y = 0.294 (± 0.01 at 25 ft-L, ± 0.01 at 3 ft-L)
25ft-L = 85.6 nit (cd/m²)
3ft-L = 10.3 nit (cd/m²)

7. Convergence Adjustment ※

Note: Before adjusting convergence, the vertical size, linearity and focus adjustments must be completed.

a) Apply a VGA signal with crosshatch pattern to the unit.
b) The brightness level should be no higher than necessary to obtain a clear pattern.
c) Loosen the convergence magnet lock ring and converge the red and blue lines at the center of the screen, by rotating the R-B Static Convergence Magnet. (See figure 28)
d) Align the converged red/blue lines with the green lines at the center of the screen by rotating the (RB)-G Static Convergence Magnet. (See figure 28)
e) Tighten the convergence magnet lock ring.
f) Remove the DY wedges (see figure 29) and slightly tilt (do not rotate) the deflection yoke horizontally and vertically to obtain good overall convergence.
g) Secure the deflection yoke by reinserting the wedges. (See figure 29).
h) If purity error is found, repeat the purity adjustments.

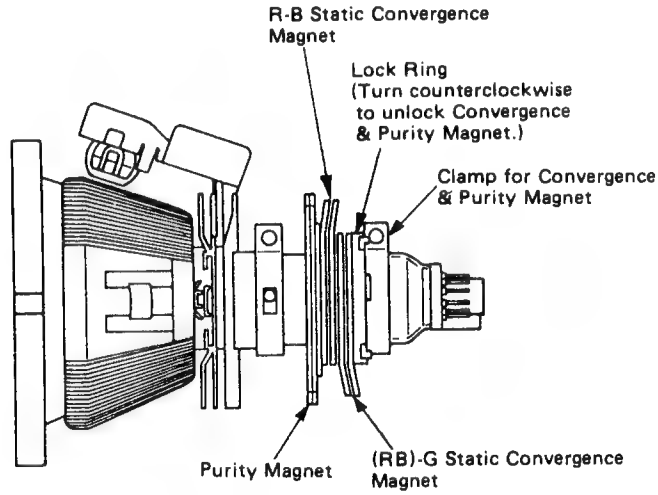


Figure 28

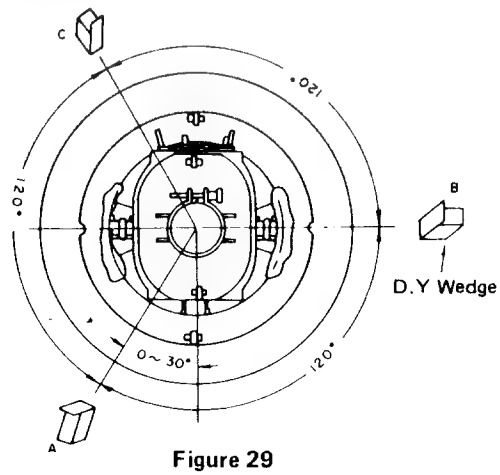


Figure 29

8. Color Purity Adjustment ※

(See figure 28 and 30)

a) Operate the display for 20 minutes, with the Bright control at max position to warm up the CRT.
b) Degauss the display fully by using an external degaussing coil.
c) Roughly adjust convergence.
d) Apply a VGA signal with white pattern to the unit.
e) Turn red and blue Cut Off controls fully counterclockwise to obtain a green field.
Adjust Drive controls if green field is not obtained.
f) Loosen the deflection yoke clamp screw and move the deflection yoke as close to the purity magnet as possible.
g) Loosen the purity magnet lock ring (see figure 28) and adjust the purity magnet to set the vertical green raster precisely at the center of the screen. (See figure 30) Then tighten the lock ring.
h) Slowly move the deflection yoke forward and adjust for the best overall green screen.
i) Tighten the deflection yoke clamp screw.
j) Produce the blue and red raster by Cut Off controls and observe that good purity is obtained on the respective field.
k) Observe that a uniform white raster is obtained by adjusting R, B Cut Off controls. If screen is not uniformly white, repeat above procedure.

Note: Purity correction magnet may be effective to control purity slightly.

※ "7. Convergence Adjustment" and "8. Color Purity Adjustment" are not necessary when the CRT is replaced as ITC.

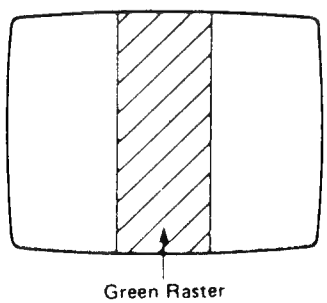


Figure 30

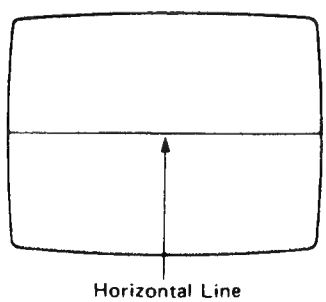


Figure 31

9. Raster Brightness Adjustment

(See A-2 and B-2 of Page 31)

a) Apply a VGA signal with full black pattern.
b) Turn R3116 (BRIGHT) and R3115 (CONTRAST) controls fully clockwise.
c) Adjust the screen control of FBT so that the Back Raster is no longer visible when viewed from a distance of 30 cm.

10. Brightness Adjustment

(See A-3 of Page 31)

a) Apply a VGA signal with full white pattern.
b) Turn R3116 (BRIGHT) and R3115 (CONTRAST) controls fully clockwise.
c) Adjust R3126 (SUB BRIGHT) to 31 ft-L brightness. 31ft-L = 106.2 nit (cd/m^2)

CAUTION: Too high R3126 (SUB BRIGHT) setting can result in lower CRT life.

11. Focus Adjustment

a) Apply a VGA signal with crosshatch pattern.
b) Focus red, green, blue and white pictures to the sharpest on the whole screen with focus control of FBT.

12. Pincushion Adjustment

(See D-4 of Page 31)

a) Apply a VGA signal with crosshatch pattern to the unit.
b) Adjust R456 (PINCUSHION) to set pincushion error is within ± 0.02 in. (0.05 mm).

13. V-Linearity Adjustment

(See C-2 of Page 31)

a) Apply a VGA signal with crosshatch pattern to the unit.
b) Adjust R416 (V. LIN.) to equal the length of A and B.

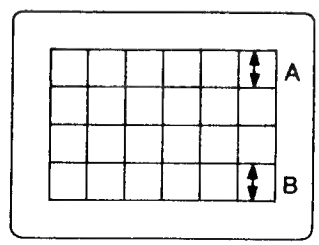


Figure 32

14. V-Center Adjustment

(See B-2 of Page 31)

a) Turn R444 (V. CENT.) to center position.

b) Apply a VGA signal with full white pattern to the unit. And turn R3116 (BRIGHT) and R3115 (CONTRAST) controls fully clockwise.

c) Adjust R4060 (V. CENT. PRE.) to set the vertical image position to center.

15. V-Size Adjustment

(See B-3 of Page 31)

a) Apply a VGA signal to the unit.

b) Turn R445 (V. SIZE) control to set click position.

c) Turn R3116 (BRIGHT) fully clockwise.

d) Adjust R408 (SUB. V. SIZE) to set the vertical width of the image is 7.2 in. (183 mm).

16. Raster Center Adjustment

(See E-5 of Page 31)

ATTENTION: This adjustment is not necessary for ordinary servicing.
Do this adjustment, when you find that the Raster center position is not in normal position.

a) Apply a VGA signal with full black pattern to the unit.

b) Turn R3116 (BRIGHT) fully clockwise.

c) Adjust using optional couplers to set the Raster center position.

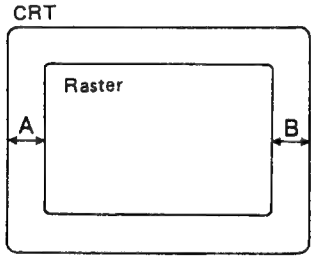


Figure 33

- A – B = – 0.47 in. ~ – 0.31 in.
  (– 12 mm ~ – 8 mm)
  use coupler PAXAJT6C1391

- A – B = – 0.31 in. ~ – 0.2 in.
  (– 8 mm ~ – 5 mm)
  use coupler PAXAJT7C1391

- A – B = – 0.2 in. ~ – 0.08 in.
  (– 5 mm ~ – 2 mm)
  use coupler PAXAJT8C1391

- A – B = – 0.08 in. ~ + 0.08 in.
  (– 2 mm ~ + 2 mm)
  no use

- A – B = + 0.08 in. ~ + 0.16 in.
  (+ 2 mm ~ + 4 mm)
  use coupler PAXAJT9C1391

17. H-Center Adjustment

(See B-2 of Page 31)

a) Apply a VGA signal with full white pattern.

b) Turn R3116 (BRIGHT) and R3115 (CONTRAST) controls fully clockwise.

c) Turn R447 (H. CENT.) to click position.

d) Adjust R5015 (H. CENT. PRE.) to set the horizontal image position to center.

18. H- Size Adjustment

(See B-2 of Page 31)

a) Apply a VGA signal with full white pattern.

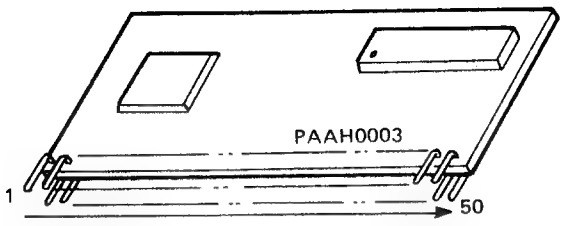
b) Turn R514 (H. SIZE) control to set click position.

c) Adjust R512 (H. SIZE PRE) to set the horizontal width of the image is 9.65 in. (245 mm).

COMPONENT REFERENCE GUIDE

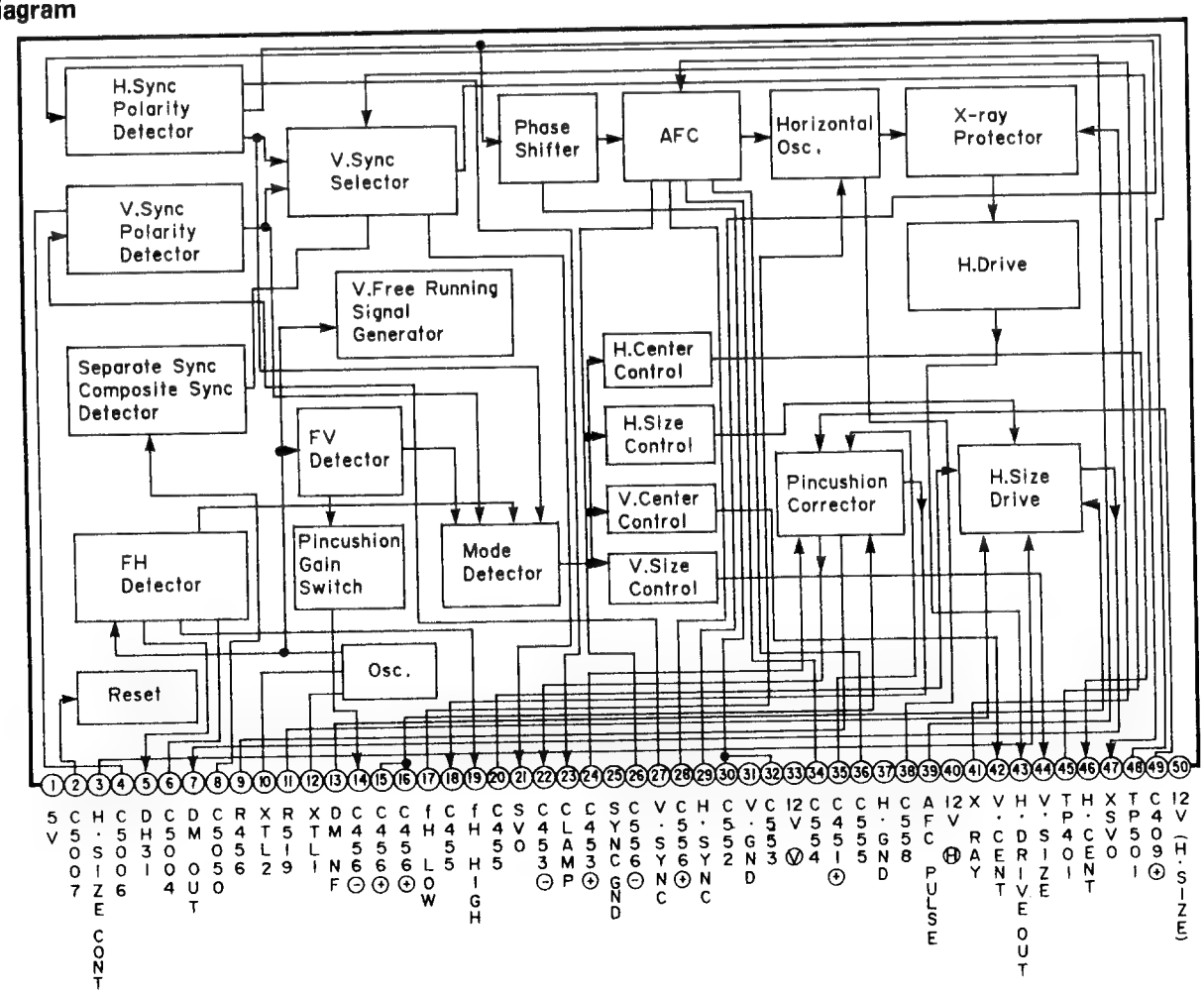
IC5002 (PAAH0003)

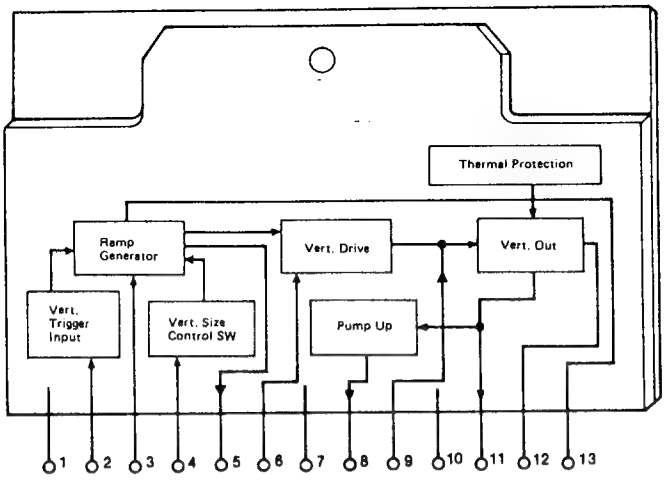
Signal/Deflection Process IC



Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	+5V	18	C455	35	C451 ⊕
2	C5007	19	fH HIGH	36	C555
3	H. SIZE CONT	20	C455	37	H.GND
4	C5006	21	SVO	38	C558
5	DH31	22	C453 ⊖	39	AFC PULSE
6	C5004	23	CLAMP	40	12V Ⓗ
7	DM OUT	24	C453 ⊕	41	X RAY
8	C5050	25	SYNC GND	42	V. CENT.
9	R456	26	C556 ⊖	43	H. DRIVE OUT
10	XTL2	27	V. SYNC	44	V. SIZE
11	R519	28	C556 ⊕	45	TP401
12	XTL1	29	H. SYNC	46	H. CENT.
13	DM NF	30	C552	47	XSVO
14	C456 ⊖	31	V. GND	48	TP501
15	C456 ⊕	32	C553	49	C409 ⊕
16	C456 ⊕	33	+12V Ⓥ	50	+12V (H. SIZE)
17	fH LOW	34	C554		

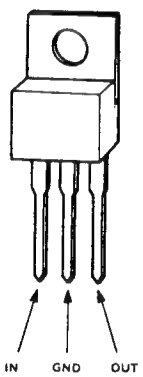
Block Diagram



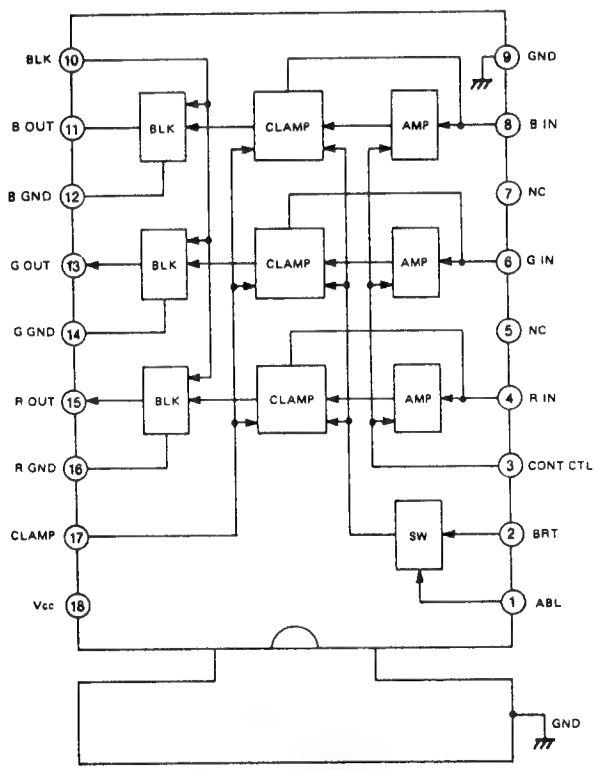


Pin No.	Pin Name	Pin No.	Pin Name
1	Power Supply (+B1)	7	Power Supply (+B7)
2	Vertical Trigger Input	8	Pump-up Output
3	Vertical Height Control	9	OSC Blocking
4	50/60 Hz Vertical Size Control Signal Input	10	GND
		11	Vertical Output
5	Ramp Waveform Generation	12	Power Supply for Vertical Output
6	AC/DC Feedback Input to Vertical Output Section	13	Ripple Filter

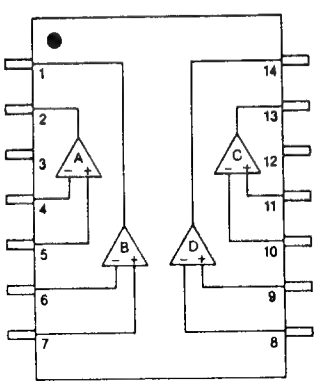
LA7836
(IC401)
V. Out



TVSUPC78M12H
(IC504)
Regulator IC (+12V)



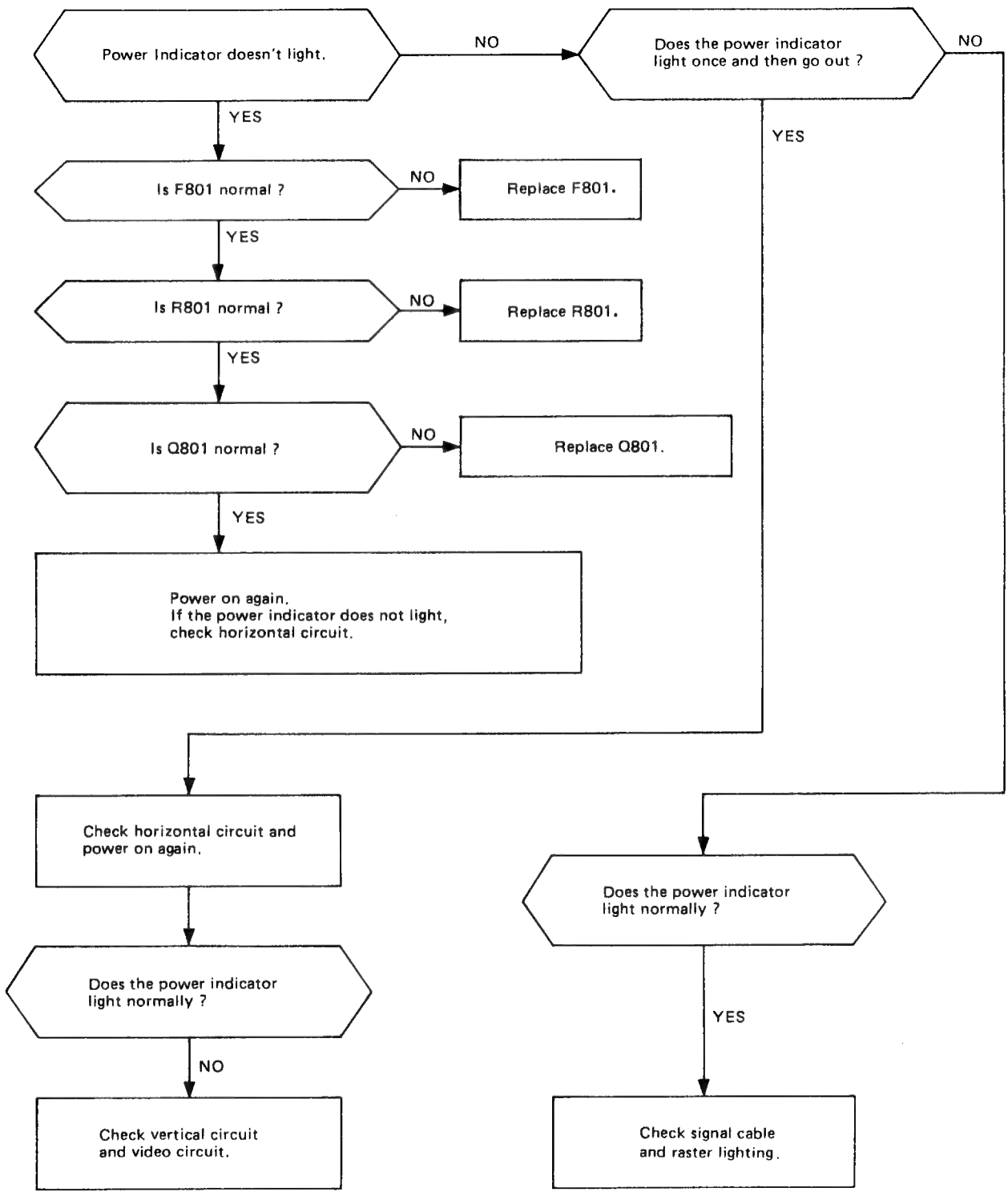
CXA1044P
(IC3501)
Analog Amp.



1. B OUTPUT
2. A OUTPUT
3. V+
4. A −INPUT
5. A + INPUT
6. B −INPUT
7. B + INPUT
8. C −INPUT
9. C + INPUT
10. D −INPUT
11. D + INPUT
12. GND
13. D OUTPUT
14. C OUTPUT

LM339N
(IC801)
Comparator

TROUBLESHOOTING FLOW CHART



No character or figures appear.

Turn the brightness control and the contrast control all the way to the right.

(Turn up the screen control and check whether the raster appears.)

Does the entire screen light up ?

NO → See the section "The raster does not appear".

YES

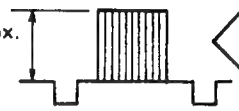
Approx. 0.7Vp-p

Are the input waveform at CO-2C pins normal ?

NO → Check the signal cable or computer.

YES

Approx. 2Vp-p

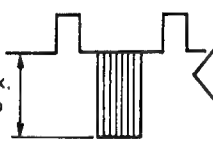


Are the waveforms at the pins 11, 13, 15 of IC3501 normal ?

NO → IC3501, its buffer or its drive circuit (Bright control, Contrast control, Clamp Pulse, and Blanking Pulse) is defective.

YES

Approx. 45Vp-p



Are the waveforms of the terminal KR, KG, or KB of CRT socket normal ?

NO → Video output circuit is defective.
Q3501 ~ Q3506
Q3511 ~ Q3513

YES

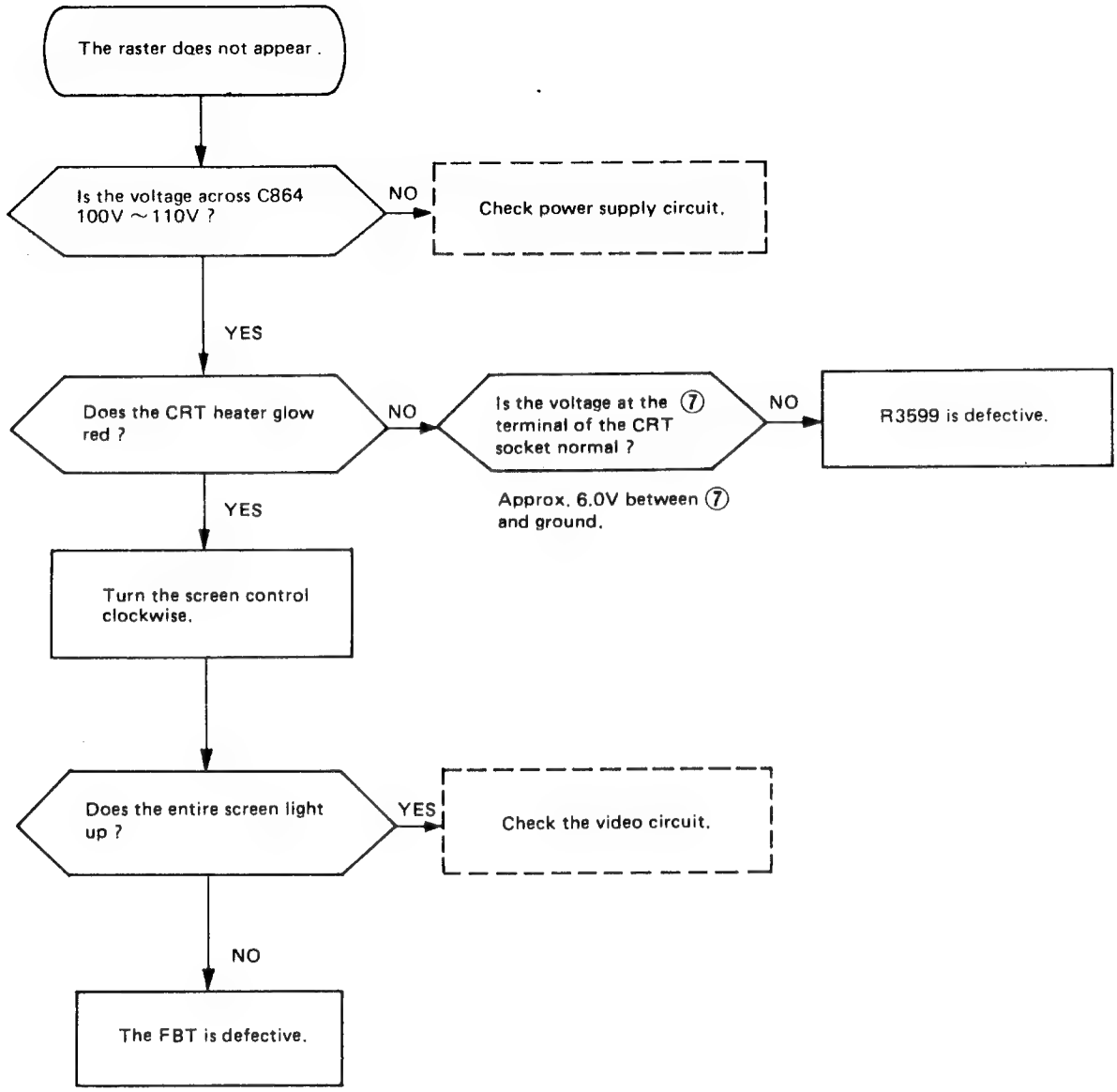
Heater 6.3V D.C.
G1 : −30V
G2 : 300 ~ 900V

Are the voltage of terminal Heater, G1 and G2 of CRT socket normal ?

NO → CRT drive circuit is defective.
FBT, D552, D525

YES

The CRT is defective.


The raster does not appear .
Is the voltage across C864 100V ~ 110V ?
NO
Check power supply circuit.
YES
Does the CRT heater glow red ?
NO
Is the voltage at the ⑦ terminal of the CRT socket normal ?
NO
R3599 is defective.
Approx. 6.0V between ⑦ and ground.
YES
Turn the screen control clockwise.
Does the entire screen light up ?
YES
Check the video circuit.
NO
The FBT is defective.

The horizontal deflection circuit is defective.

Is the voltage across C864 100V ~ 110V ?

NO

Is F801 normal ?

NO

Replace F801 and power on again.

Is F801 normal ?

NO

The power supply circuit is defective or Q553, D559 or D560 is defective.

YES

YES

Is the power supply circuit normal ?

NO

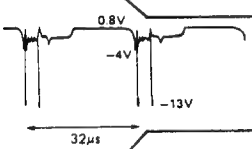
Check power supply circuit.

YES

Is the waveform at the base of Q553 normal ?

YES

The FBT is defective.

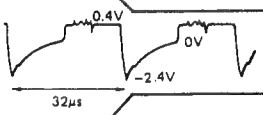


NO

Is the waveform at the base of Q552 normal ?

YES

Q552 or T551 is defective.

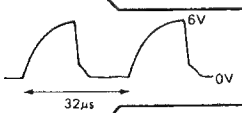


NO

Is the waveform normal at pin 43 of IC5002 ?

YES

Q559 is defective.



NO

Is the voltage at pins 50 and 40 of IC5002 about 12.0V ?

NO

Check the 12V line.
Check IC504.

YES

IC5002 is defective.

YES

Are Q553, D559 and D560 normal ?

NO

Replace F801 and Q553, D559 or D560.

YES

Replace F801.

One-Color is missing.

Approx. 0.7Vp-p

Are the waveforms at CO-2C pins normal ?

NO → Check the signal cable or computer.

YES

Approx. 2Vp-p

Are the waveforms at pins 11, 13, 15 of IC3501 normal ?

NO → IC3501 is defective.

YES

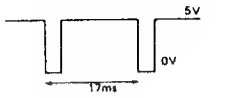
Approx. 45Vp-p

Are the waveforms of the terminal KR, KG, or KB of CRT socket normal ?

NO → Video output circuit is defective. Q3501 ~ Q3506, Q3511 ~ Q3513.

YES

The CRT is defective.



The vertical synchronization does not hold.

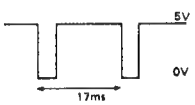
Are the waveforms normal at pins 2 and 5 of IC401 ?

YES

IC401 is defective.

NO

Check IC5002 and its drive circuits.



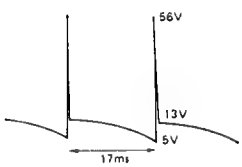
The picture is one horizontal line.

Is the waveform normal at pin 47 of IC5002 ?

NO

IC5002 and its drive circuits are defective.

YES



Is the waveform normal at pin 11 of IC401 ?

NO

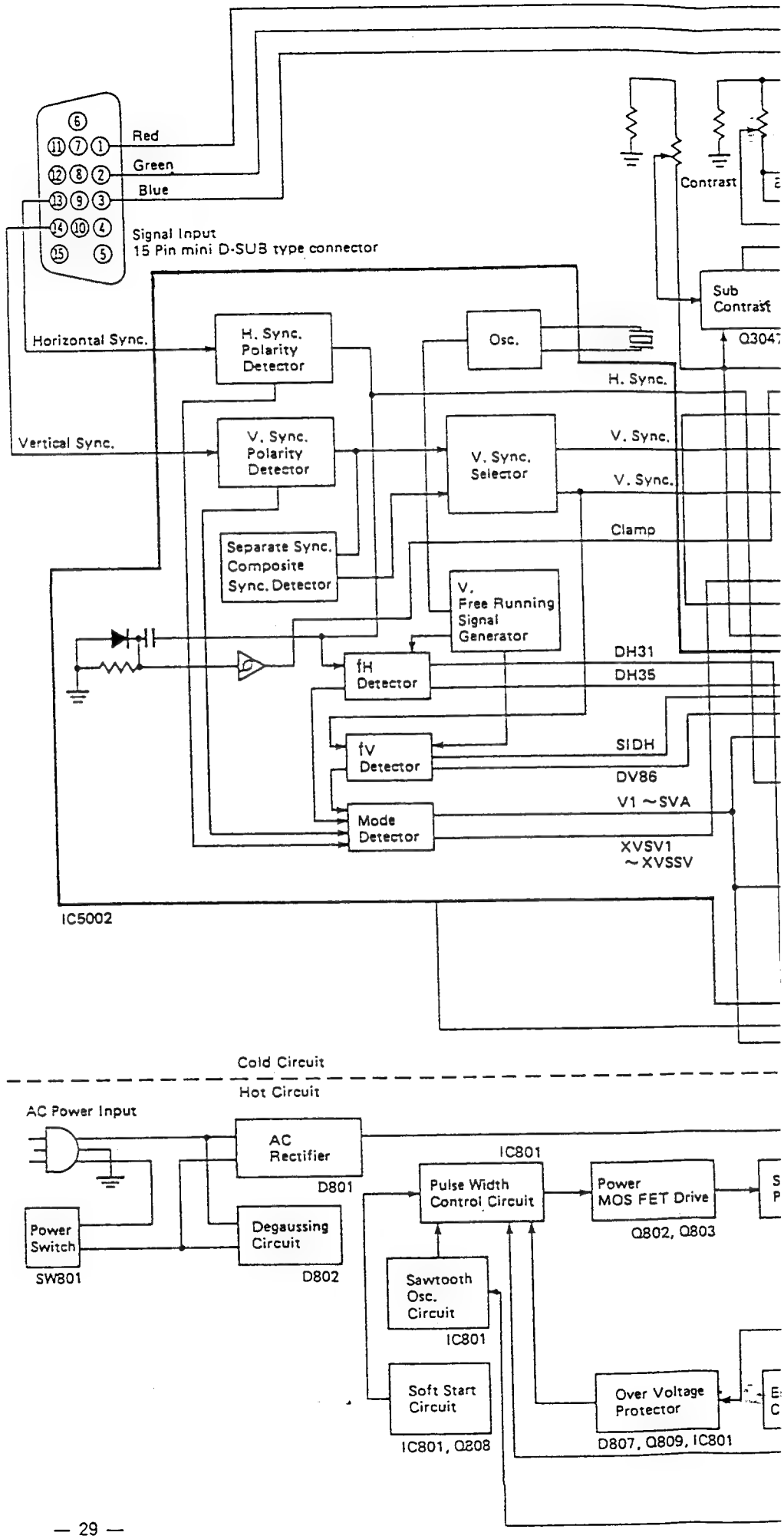
IC401 and its drive circuits are defective.

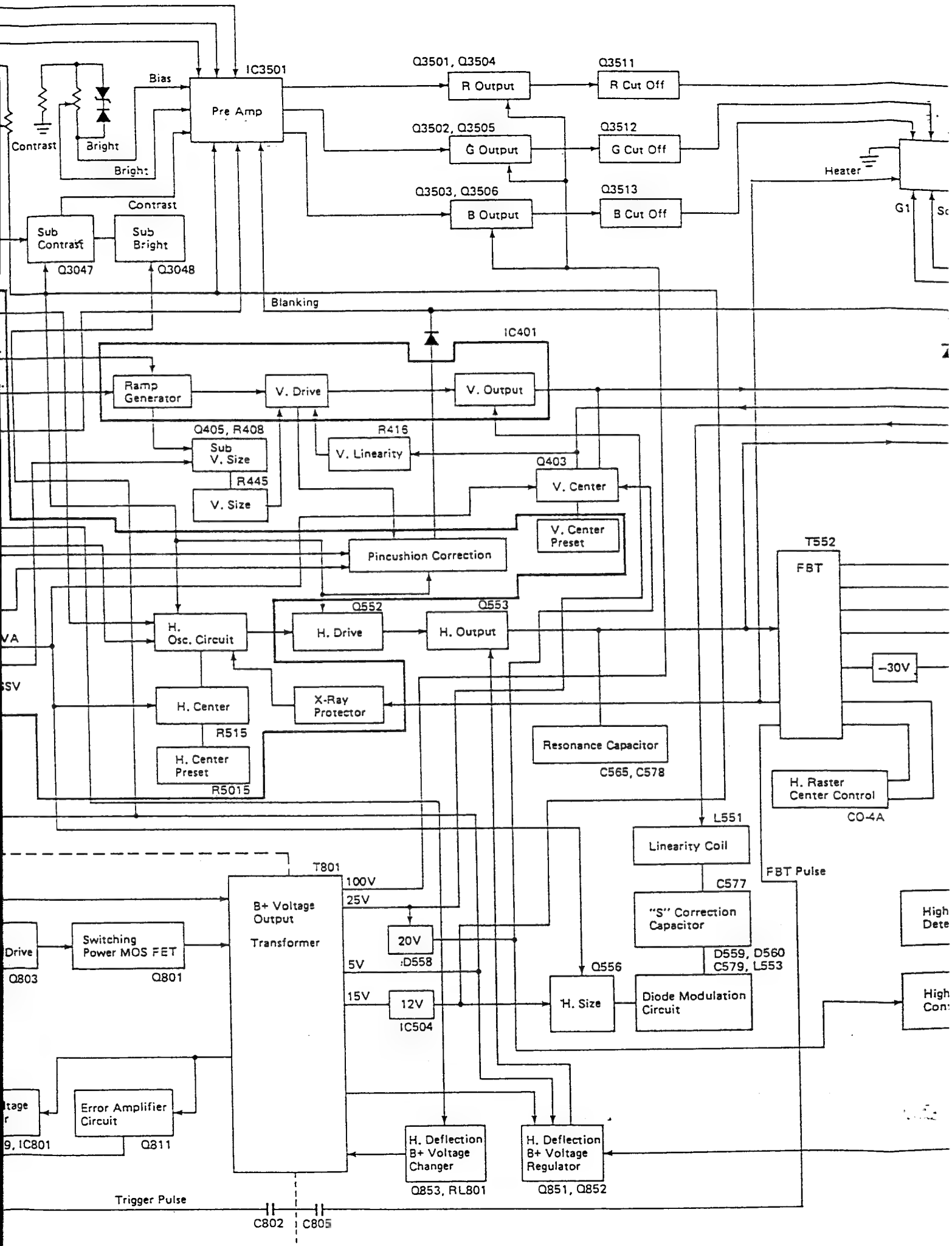
YES

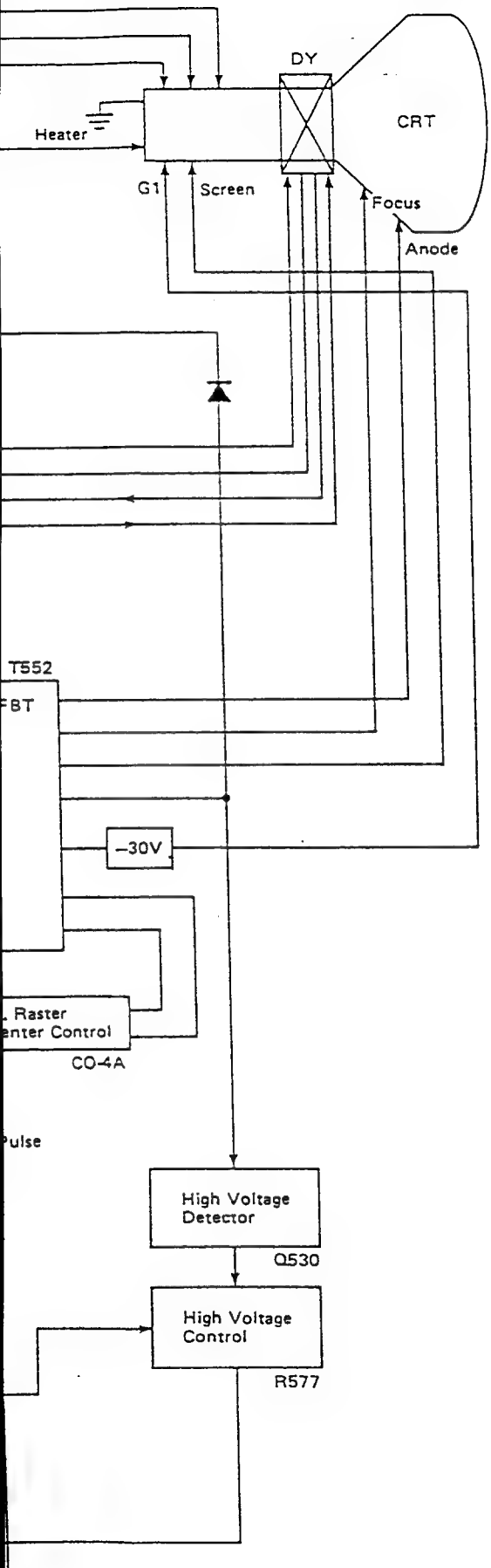
Check the deflection yoke.

MEMO

BLOCK DIAGRAM

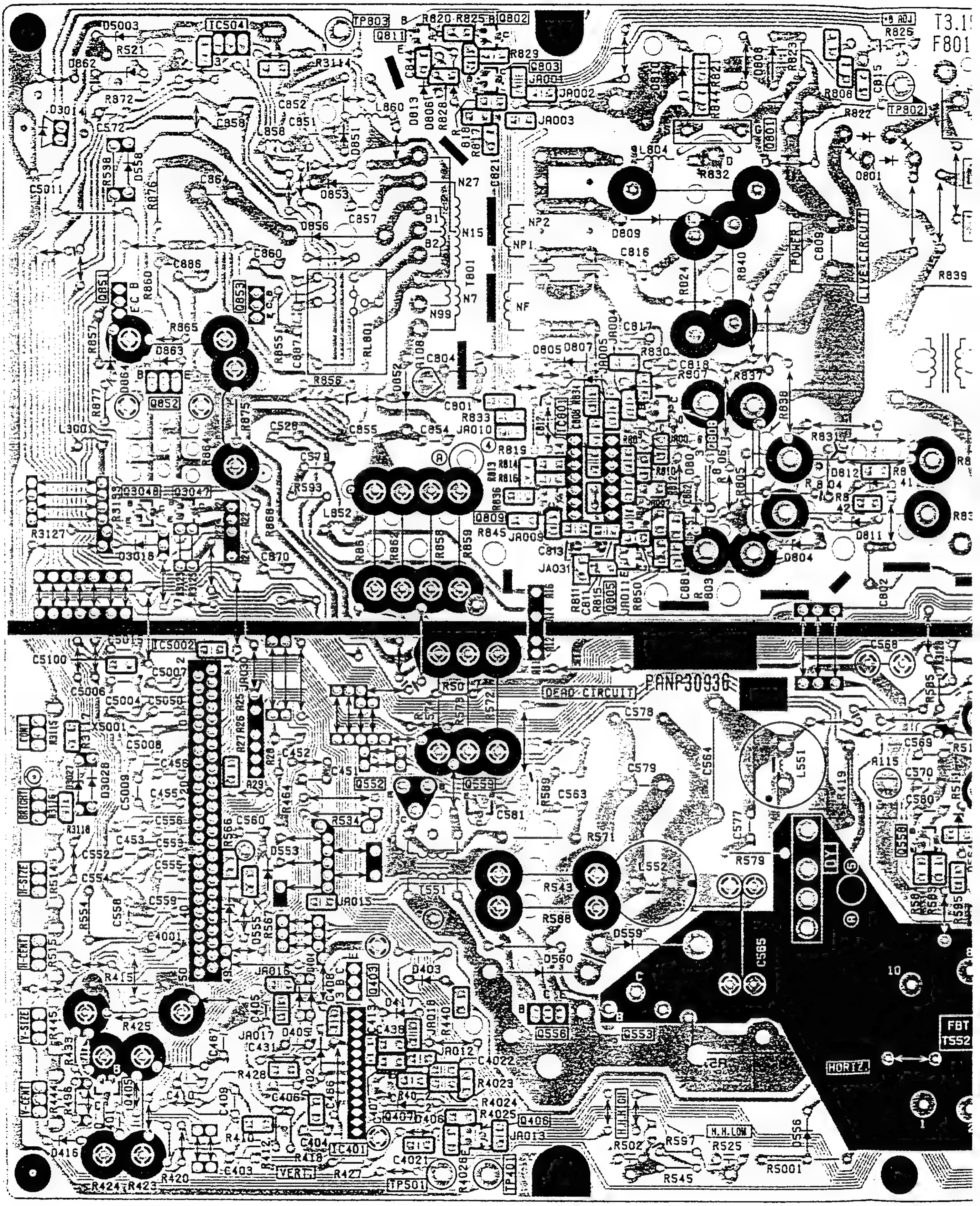



IC3501
Bias
Pre Amp
Contrast
Bright
Bright
Contrast
Sub Contrast
Sub Bright
Q3047
Q3048
Q3501, Q3504
R Output
Q3511
R Cut Off
Q3502, Q3505
G Output
Q3512
G Cut Off
Q3503, Q3506
B Output
Q3513
B Cut Off
Heater
G1
Blanking
IC401
Ramp Generator
V. Drive
V. Output
Q405, R408
Sub V. Size
R445
V. Size
R416
V. Linearity
Q403
V. Center
V. Center Preset
Pincushion Correction
T552
FBT
Q552
Q553
H. Osc. Circuit
H. Drive
H. Output
-30V
H. Center
R515
H. Center Preset
R5015
X-Ray Protector
Resonance Capacitor
C565, C578
H. Raster Center Control
CO-4A
L551
Linearity Coil
FBT Pulse
C577
"S" Correction Capacitor
D559, D560
C579, L553
T801
100V
25V
B+ Voltage Output Transformer
20V
D558
5V
Q556
15V
12V
IC504
H. Size
Diode Modulation Circuit
Switching Power MOS FET
Q803
Q801
Error Amplifier Circuit
Q811
H. Deflection B+ Voltage Changer
Q853, RL801
H. Deflection B+ Voltage Regulator
Q851, Q852
Trigger Pulse
C802
C805


DY
CRT
Heater
G1
Screen
Focus
Anode
T552
FBT
–30V
Raster
enter Control
CO-4A
Pulse
High Voltage
Detector
Q530
High Voltage
Control
R577

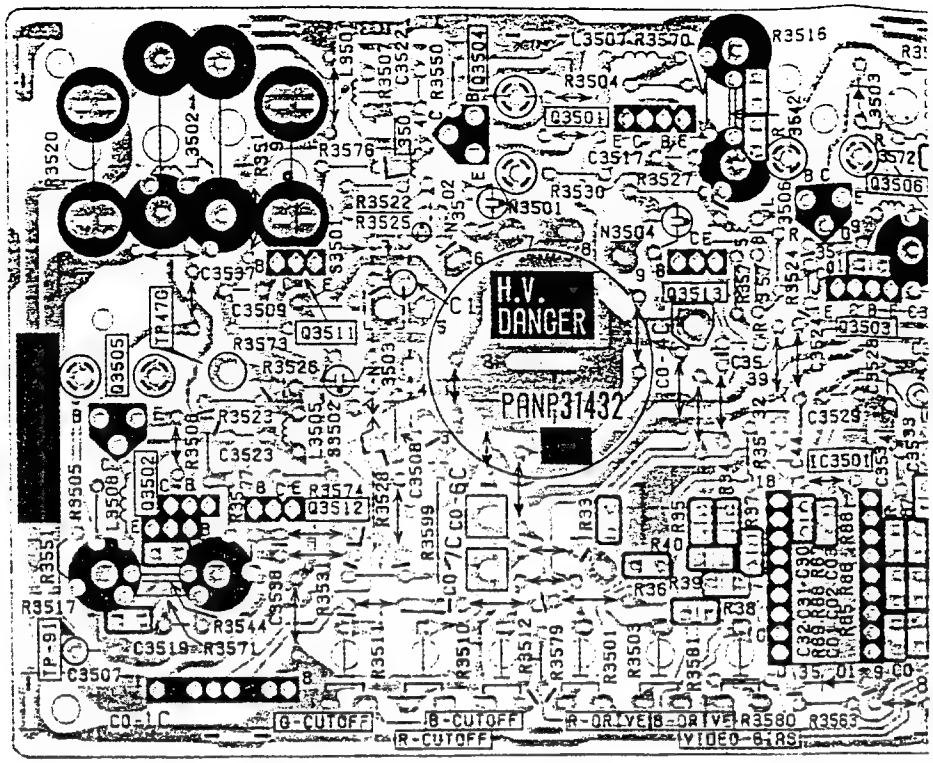
CIRCUIT BOARD

1. Main Board (A-Board)

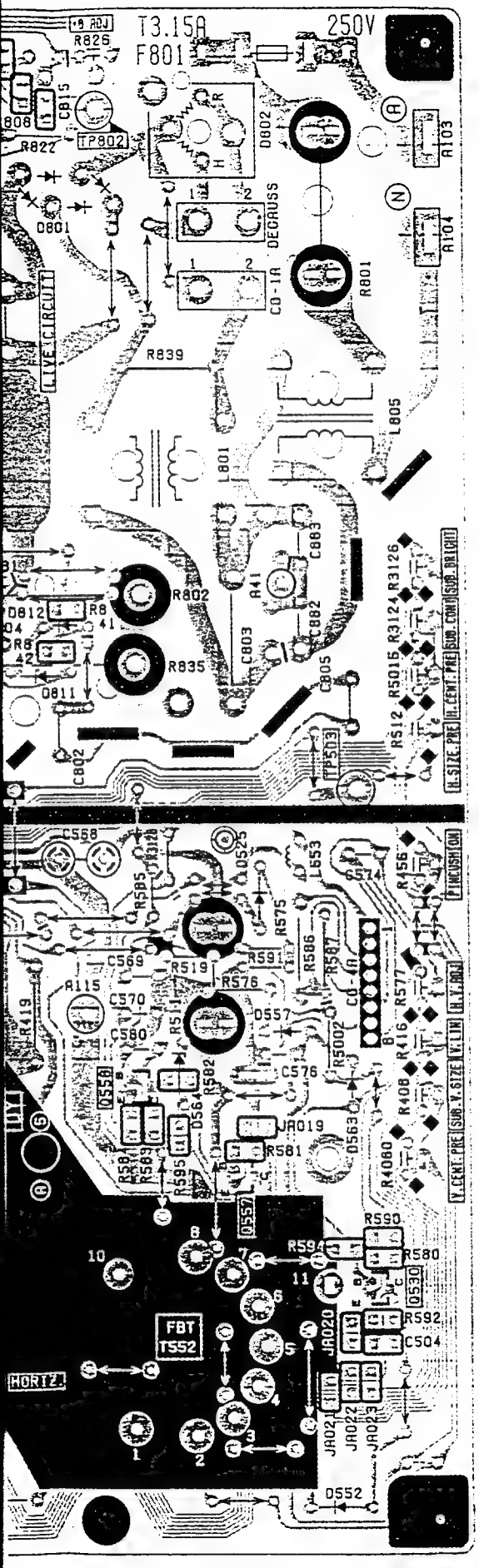


PANP30

2. Neck Board (C-Board)

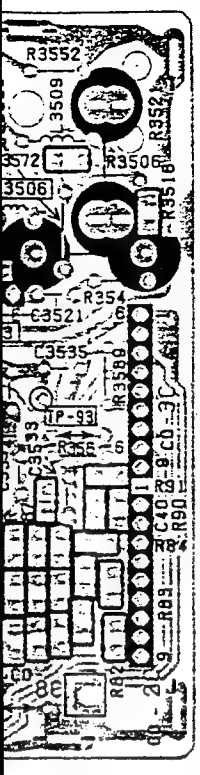


PANP31432ZA/Solder Side View



PANP30936ZA/Solder Side View

SCHEMATIC DIAGRAM

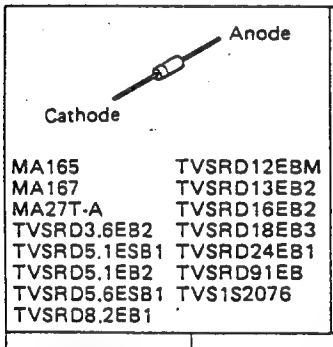


IMPORTANT SAFETY NOTICE

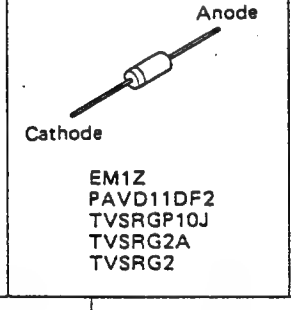
THE SHADED AREA ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X—RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURER'S SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SHADED AREAS OF THE SCHEMATIC.

NOTE:

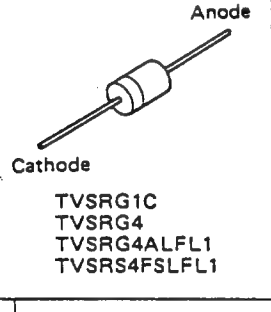
1. All resistors are carbon 1/4W resistor, unless otherwise noted with the following marks.
   Unit of resistance is OHM (Ω), (K = 1,000, M = 1,000,000).
   - △ : Solid
   - □ : Chip (1/8W)
   - ○ : Non-flammable
   - ⊘ : Cement
   - Thermistor
   - ⊗ : Fuse
   - ⊠ : Metal Oxide
   - ◎ : Metal Film
   - Ⓛ : Leadless Type
2. CAPACITOR
   All capacitors are ceramic 50V capacitor, unless otherwise noted with the following marks.
   Unit of capacitance is μF, unless otherwise noted.
   - Electrolytic
   - (NP) : Bipolar
   - (Z) : Z Type
   - (T) : Tantalum
   - (NH) : NH Type
   - ◎ : Titanium Oxide
   - ⊗ : Temp Compensation
   - (M) : Polyester
   - (S) : Polystyrene
   - ⊠ : Polypropylene
   - (m) : Metalized Polyester
   - □ : Chip (SL)
   - (B) : Chip (not SL)
3. COIL
   Unit of inductance is μH.
4. TEST POINT
   ▽ : Test point position.
5. VOLTAGE MEASUREMENT
   Voltage is measured by a volt ohm meter with DC 20k OHM/V receiving a VGA (Mode 3) signal when all customer's controls are set to the click position. (Brightness and Contrast controls are set to the maximum position.)
6. When arrow mark (→) is found, connection is easily found along with the direction of an arrow.
7. This schematic diagram is the latest at the time of printing and subject to change without notice.



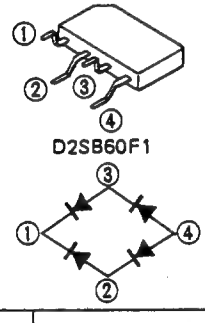
MA165
MA167
MA27T-A
TVSRD3.6EB2
TVSRD5.1ESB1
TVSRD5.1EB2
TVSRD5.6ESB1
TVSRD8.2EB1
TVSRD12EBM
TVSRD13EB2
TVSRD16EB2
TVSRD18EB3
TVSRD24EB1
TVSRD91EB
TVS1S2076



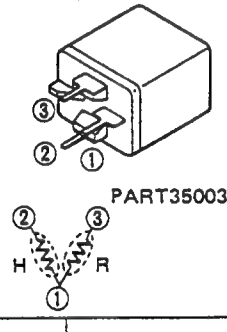
EM1Z
PAVD11DF2
TVSRGP10J
TVSRG2A
TVSRG2



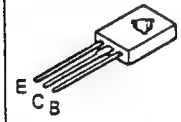
TVSRG1C
TVSRG4
TVSRG4ALFL1
TVSRS4FSLFL1



D2SB60F1

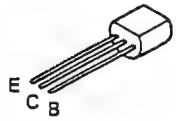


PART35003

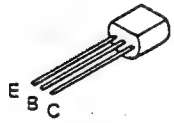


2SC2688
2SC4001

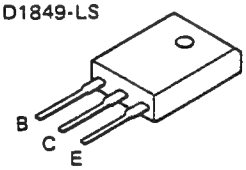
MPSA43C



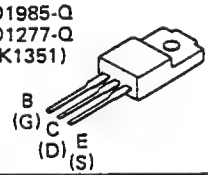
TVS2SC2901K

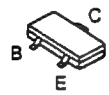


2SD1849-LS

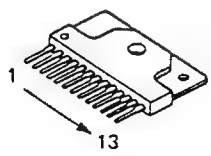


2SD1985-P
2SD1985-Q
2SD1277-Q
(2SK1351)



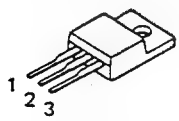


KSA812-D1L
KSC1623-C1L

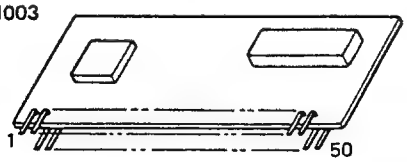


LA7836

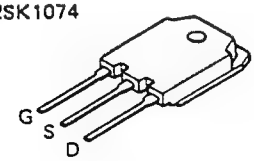
TVSUPC78M12H

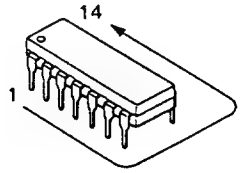


PAAH003

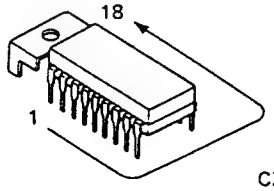


2SK1074

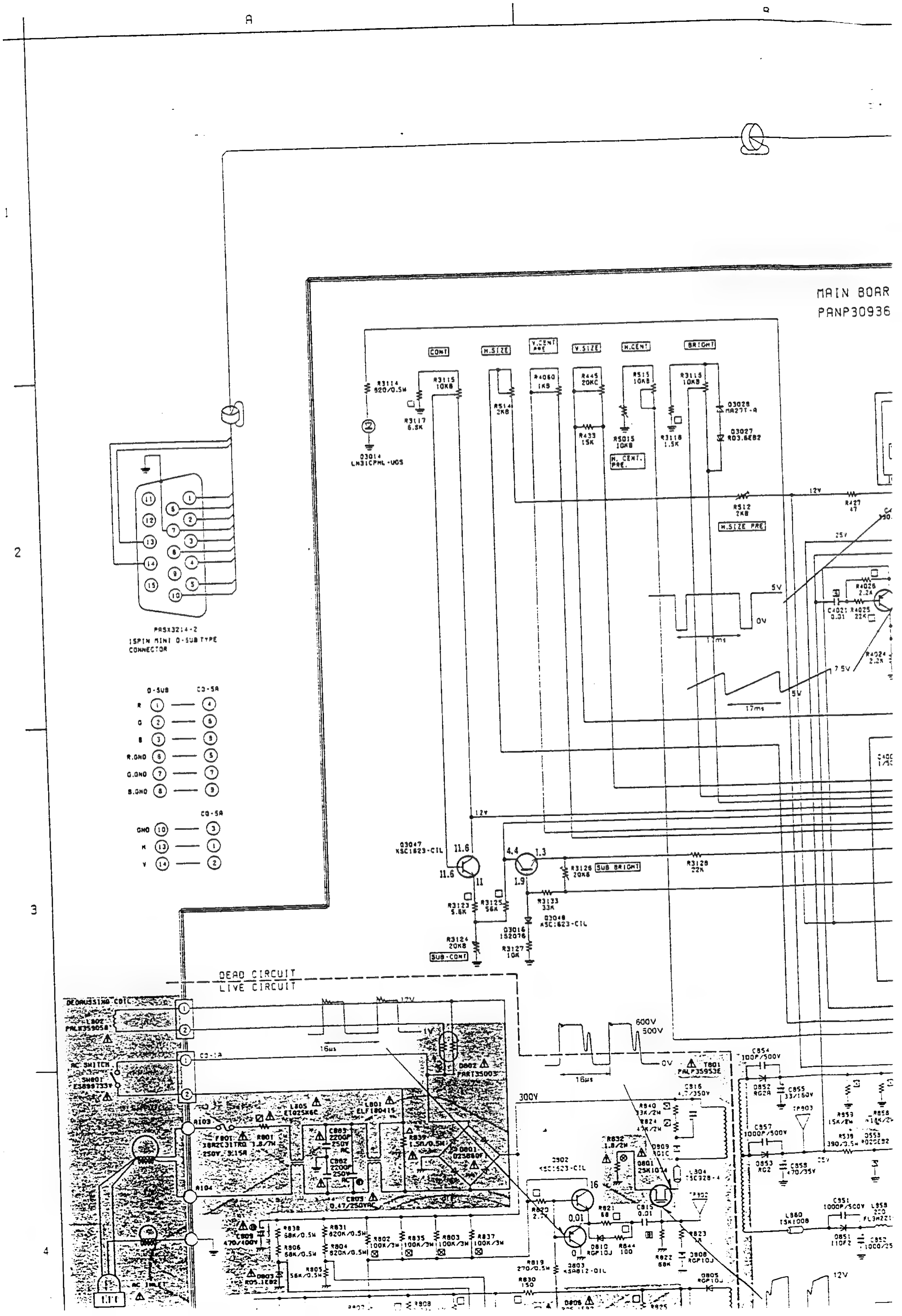




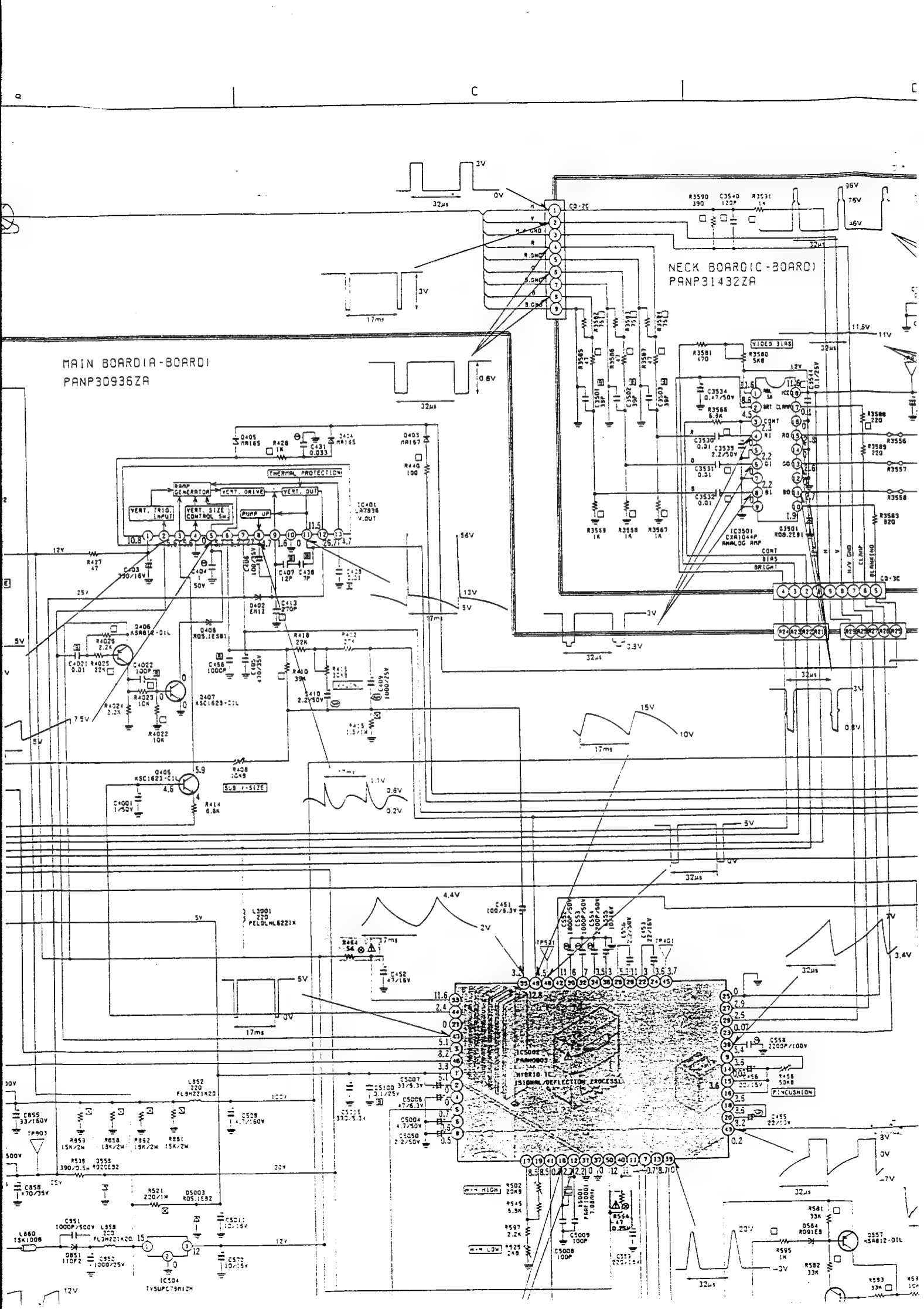
LM339N

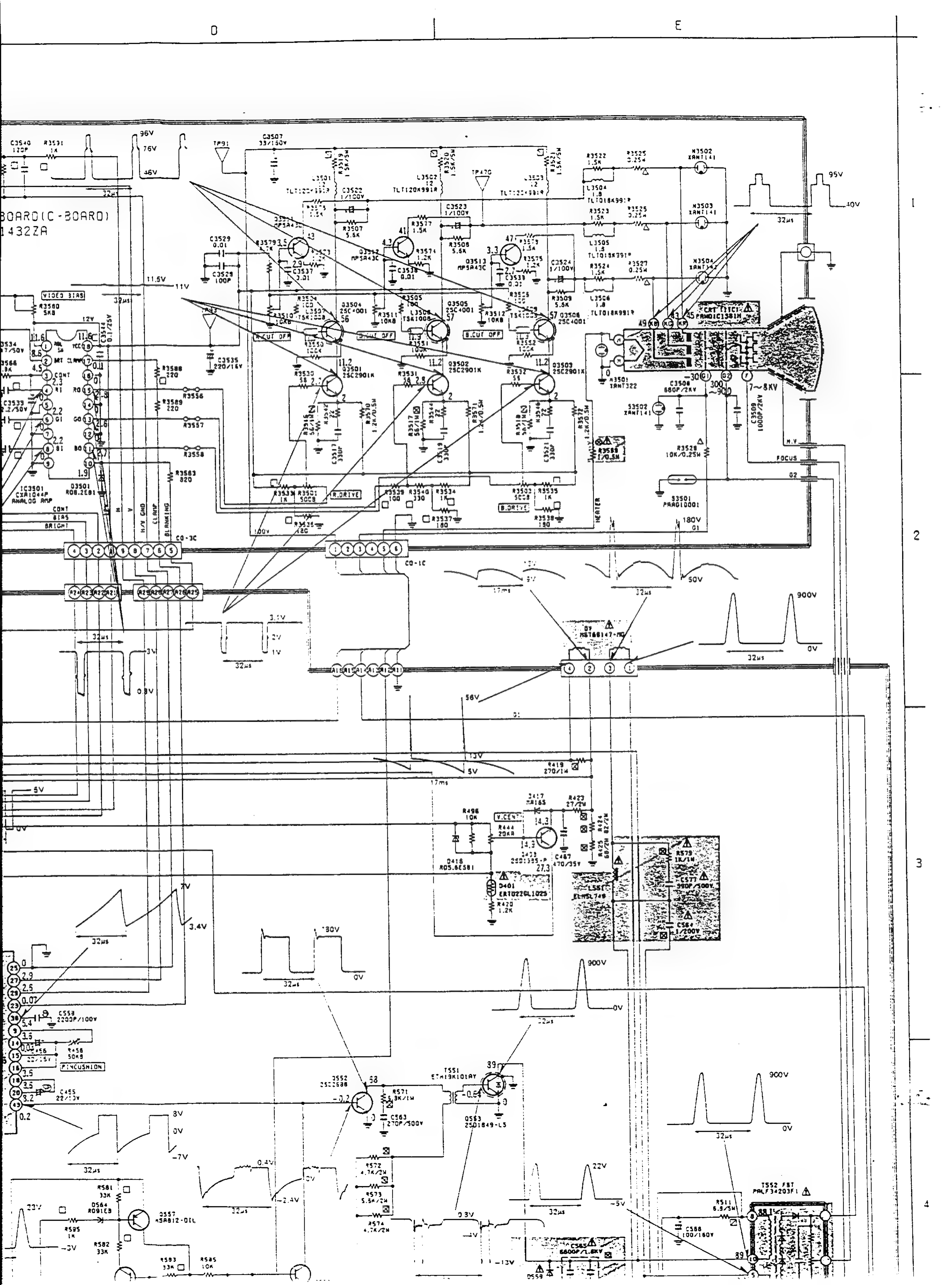


CXA1044P

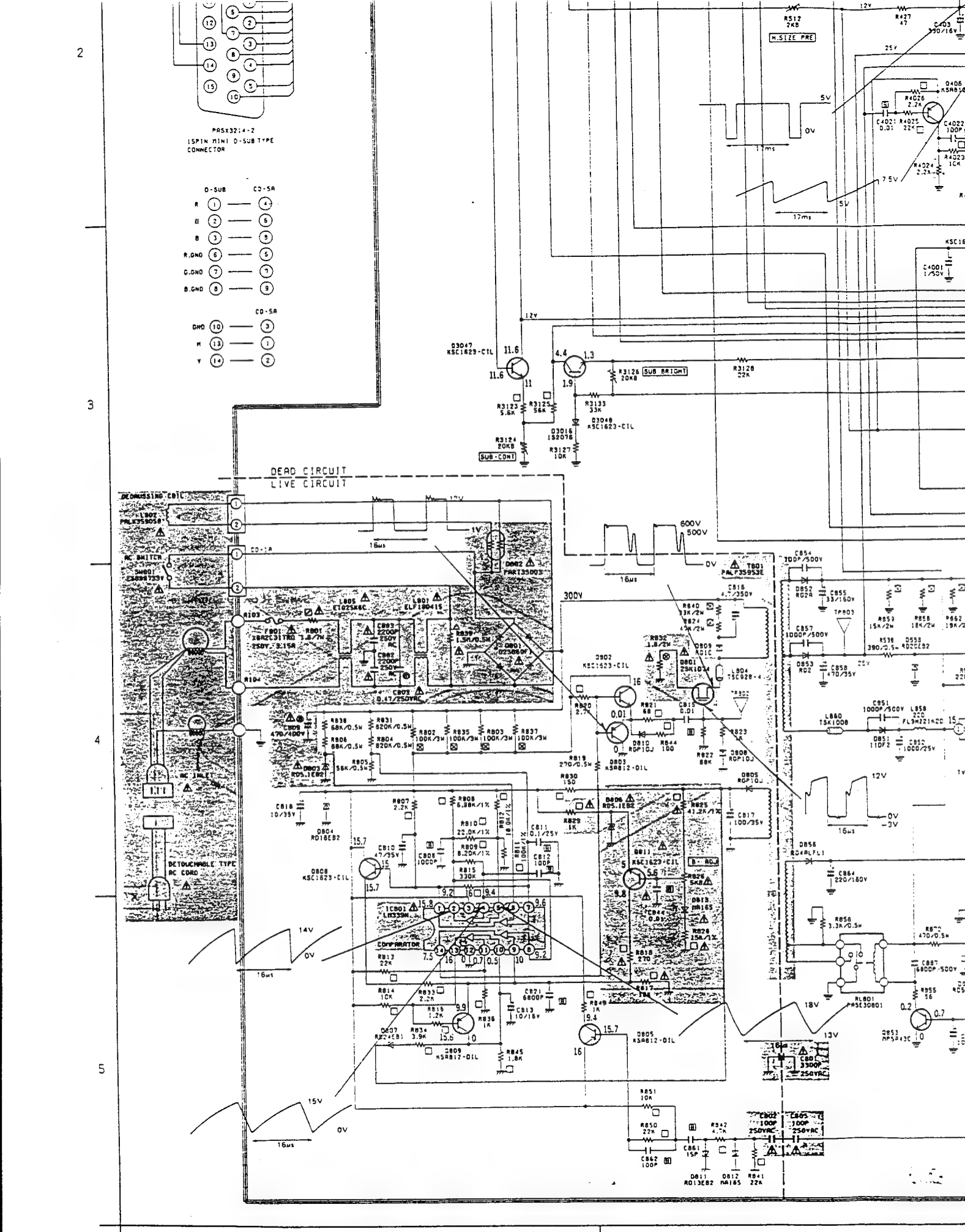


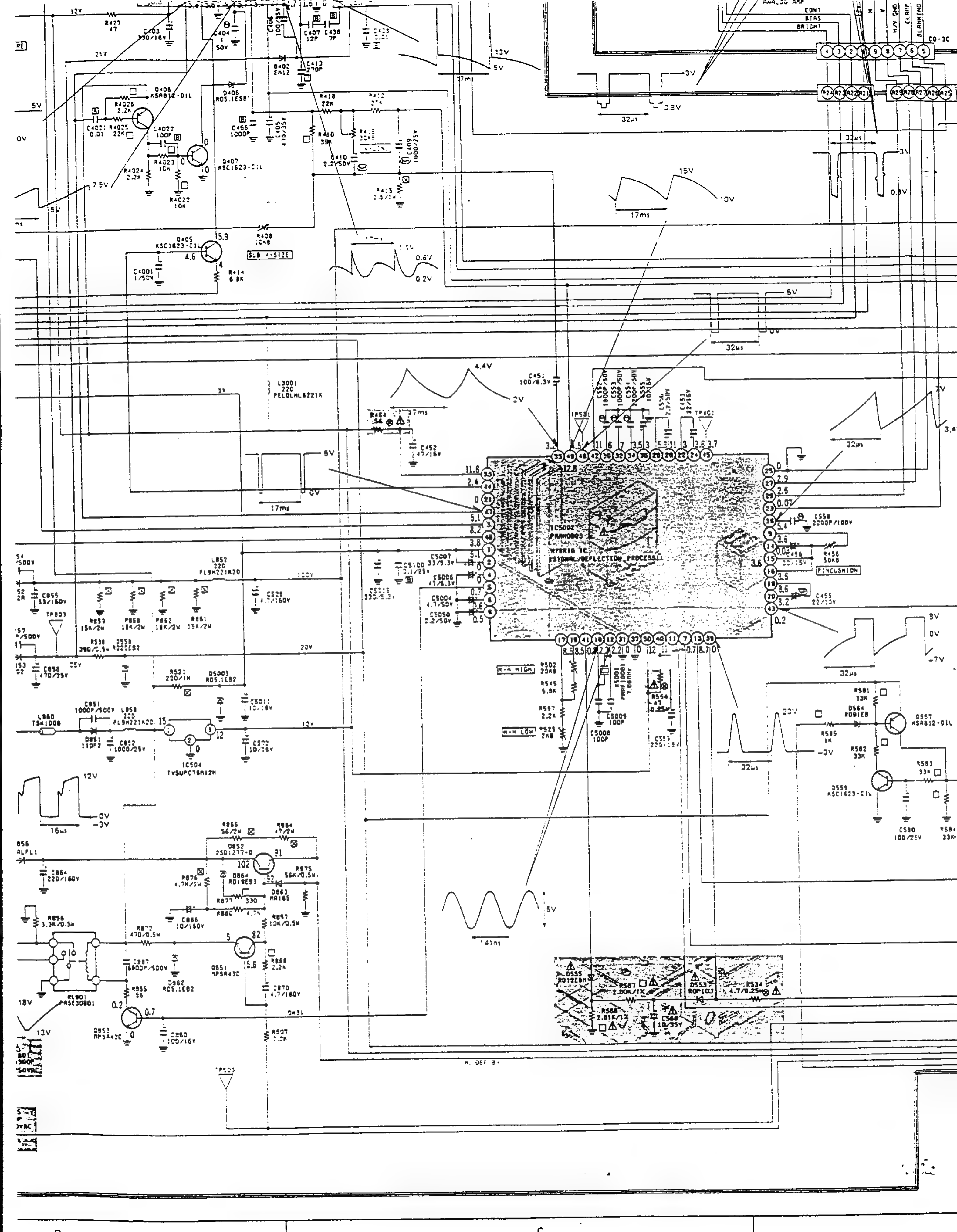
A
MAIN BOAR
PANP30936
CONT
H.SIZE
V.CENT PRE
V.SIZE
H.CENT
BRIGHT
R3114 520/0.5W
R3115 10KB
R3117 6.8K
R4060 1KB
R445 20KC
R515 10KB
R5015 10KB
R433 15K
R3116 10KB
R3118 1.5K
R514 2KB
H. CENT. PRE.
D3028 MA27T-A
D3027 RD3.6EB2
D3014 LN31CPHL-UOS
R512 2KB
H.SIZE PRE
R427 47
12V
25V
5V
0V
17ms
7.5V
PASX3214-2
15PIN MINI D-SUB TYPE CONNECTOR
D-SUB
CD-5A
R
G
B
R.GND
G.GND
B.GND
GND
H
V
Q3047 KSC1623-CIL
Q3048 KSC1623-CIL
R3126 20KB
SUB BRIGHT
R3128 22K
R3123 5.6K
R3125 56K
R3133 33K
D3016 1S2076
R3124 20KB
R3127 10K
SUB-CONT
DEAD CIRCUIT
LIVE CIRCUIT
DEGAUSSING COIL
L802 PALP35905A
AC SWITCH
CD-1A
16μs
600V
500V
T801 PALP35953E
300V
D802 PART35005
L805 ETQ25H6C
L801 ELF18041S
C803 0.47/250VAC
C809 470/400V
D803 RD5.1EB2
R805 56K/0.5W
R806 56K/0.5W
R838 56K/0.5W
R831 620K/0.5W
R804 620K/0.5W
R802 100K/3W
R835 100K/3W
R803 100K/3W
R837 100K/3W
R819 270/0.5W
R830 150
Q802 KSC1623-CIL
Q803 KSA812-OIL
Q801 2SK1034
R832 1.8/2W
D809 RG1C
L804 TSC328-4
D810 RGP10J
R844 100
R822 68K
D808 RGP10J
D805 RGP10J
C854 100P/500V
D852 RG2A
C855 33/160V
C857 1000P/500V
D853 RG2
C858 470/35V
R853 15K/2W
R539 390/0.5W
C851 1000P/500V
L860 TSK1008
D851 11DF2
12V


MAIN BOARD(A-BOARD)
PANP30936ZA
NECK BOARD(C-BOARD)
PANP31432ZA
THERMAL PROTECTION
RAMP GENERATOR
VERT. DRIVE
VERT. OUT
VERT. TRIG. INPUT
VERT. SIZE CONTROL SW
PUMP UP
IC401 LA7836 V.OUT
VIDEO BIAS
IC3501 CXA1044P ANALOG AMP
CONT BIAS
BRIGHT
SUB V-SIZE
IC5002 PRAM0903
HYBRID IC (SIGNAL/DEFLECTION PROCESS)
PINCUSHION
IC504 TVSUPC78M12H



D
E
1
2
3
4
BOARD(C-BOARD)
1432ZA
VIDEO BIAS
IC3501
CXA1044P
ANALOG AMP
CONT
BIAS
BRIGHT
R.CUT OFF
G.CUT OFF
B.CUT OFF
R.DRIVE
B.DRIVE
CRT (1C1)
PRAOIC1381N
Q3501 2SC2901K
Q3502 2SC2901K
Q3503 2SC2901K
Q3504 2SC4001
Q3505 2SC4001
Q3506 2SC4001
CO-3C
CO-1C
HEATER
H.V
FOCUS
G2
S3501
PRAO10001
V.CENT
PINCUSHION
T551
TS52 FBT
PALF34203F1
Q553
2SD1849-L5
Q557
32μs
17ms
900V
0V
95V
40V
180V
50V

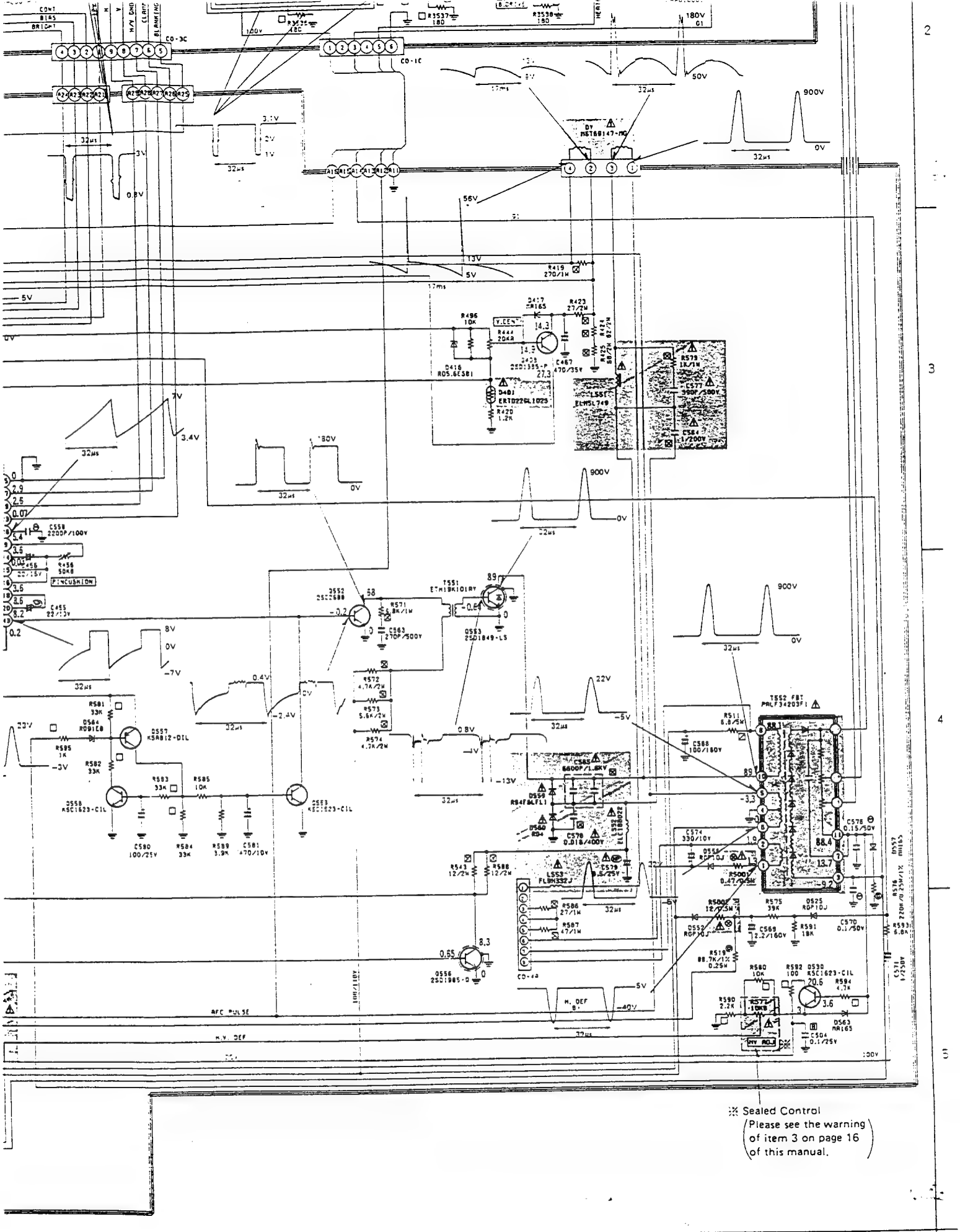

DEAD CIRCUIT
LIVE CIRCUIT
SUB BRIGHT
SUB-CONT
H.SIZE PRE
COMPARATOR
DETOUCHABLE TYPE
PC CORD
AC INLET
AC SWITCH
D-SUB
CO-SA
R
G
B
R.GND
G.GND
B.GND
GND
H
V
PBSx32:4-Z
15PIN MINI D-SUB TYPE
CONNECTOR
12V
5V
0V
7.5V
600V
500V
300V
14V
15V
18V
13V
-3V
16ms
17ms
1V
A
B
2
3
4
5



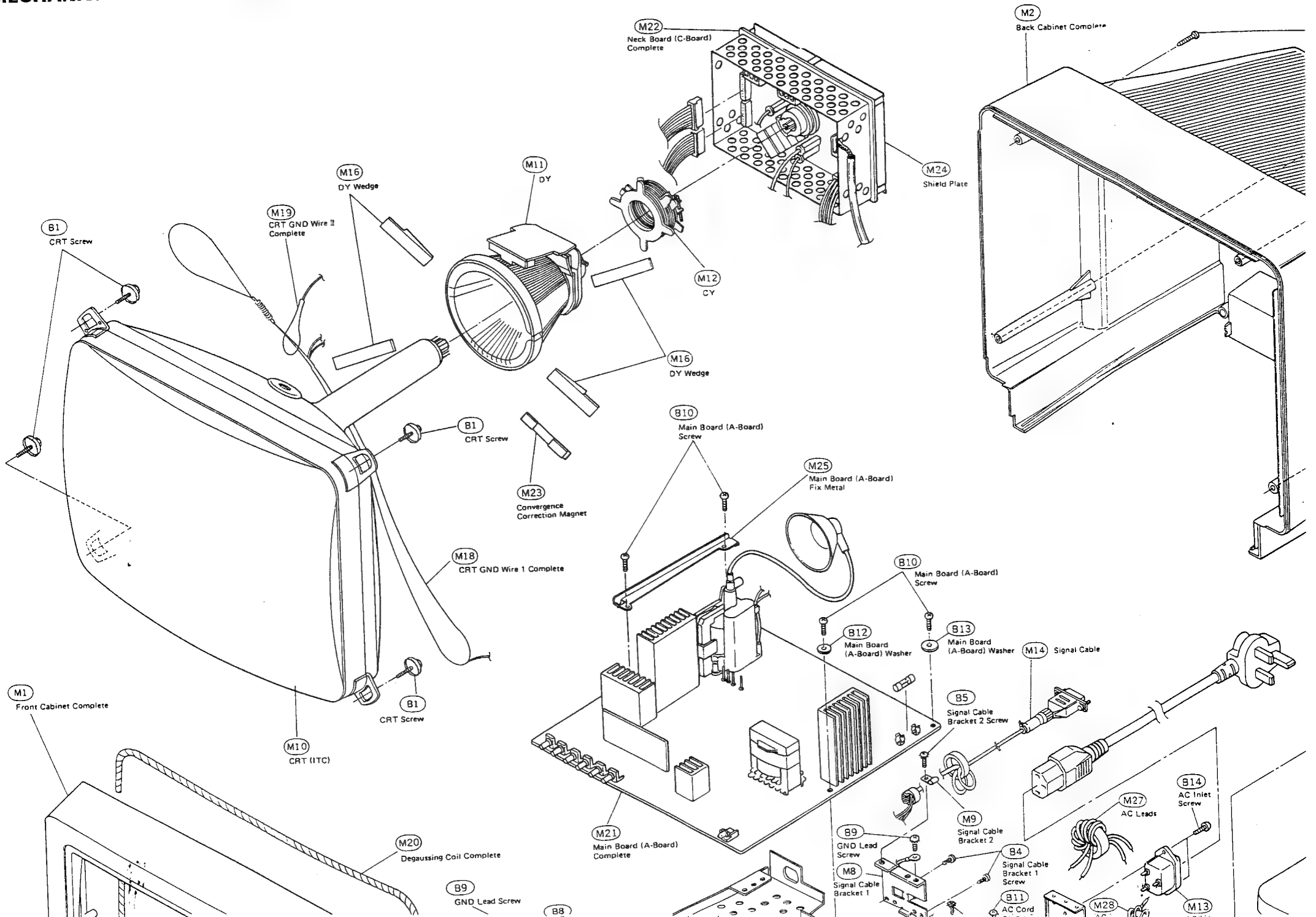
IC5002
HYBRID IC
(SIGNAL/DEFLECTION PROCESS)
PINCUSHION
SUB V-SIZE
W-H HIGH
W-H LOW
CONT
BIAS
BRIGHT
H/V GND
CLAMP
BLANKING
CO-3C
H. DEF B+
IC504
Q405
KSC1623-C1L
Q406
KSA812-D1L
Q407
KSC1623-C1L
Q557
KSA812-D1L
Q558
KSC1623-C1L
Q851
MPSA43C
Q852
2SD1277-0
Q853
MPSA42C
RL801
PASE30801
L852
L858
L860
TSK1008
X5001
TP503
TP531
TP601
TP803
17ms
32µs
16µs
141ns

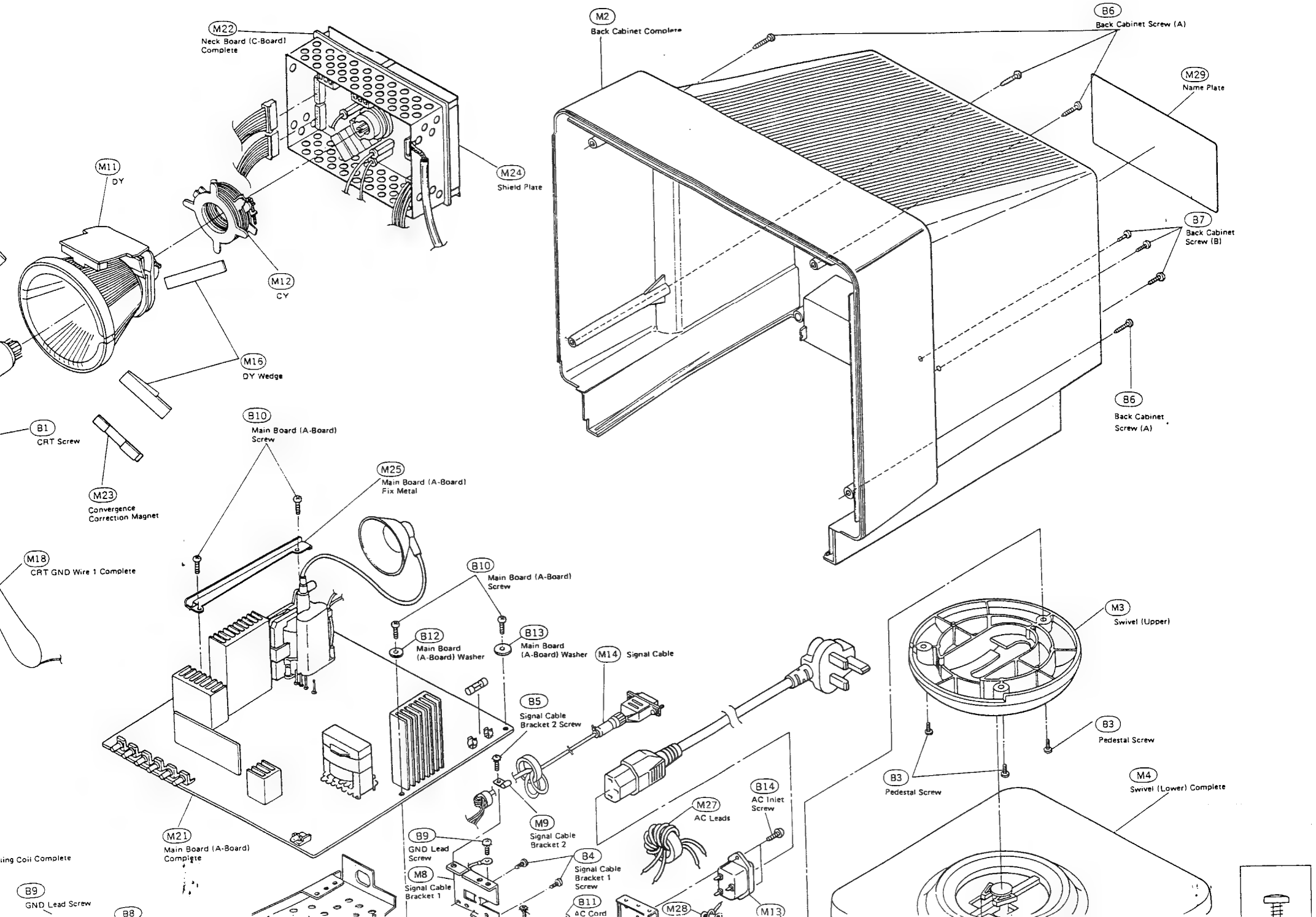
B

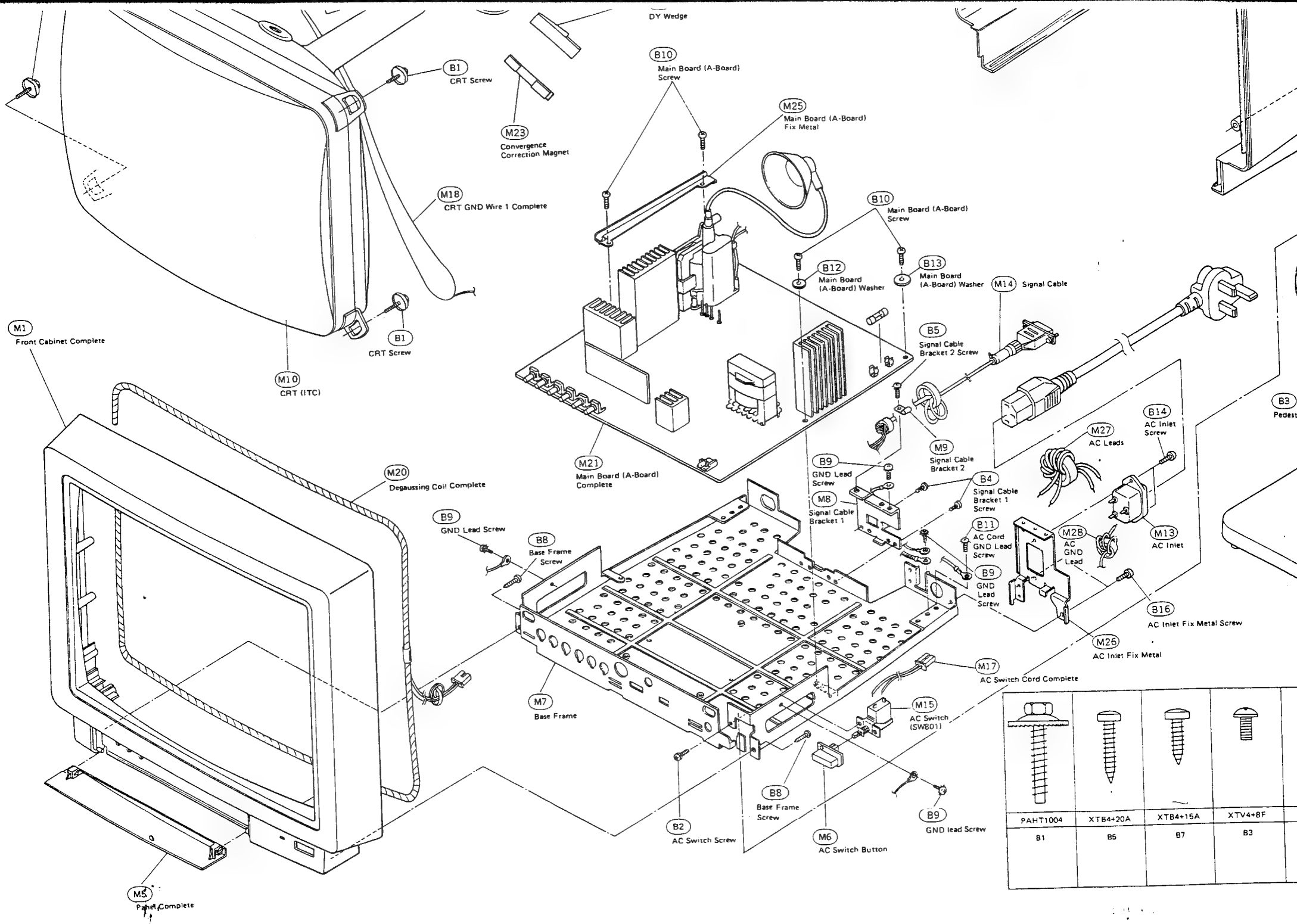
C


CONT
BRIGHT
H/V GND
CLAMP
BLANKING
CO-3C
CO-1C
180V
G1
50V
900V
0V
32μs
56V
5V
13V
12ms
R419 270/1W
R423 27/2W
R496 10K
R444 20KΩ
D417 RR165
D416 RD5.6ESB1
D401 ERT0226L1025
C467 470/35V
R420 1.2K
R579 1K/1W
C577 390P/500V
C564 1/200V
LS51 ELHSL749
C558 2200P/100V
C455 22/13V
R456 50KB
PINCUSHION
TS51 ETH1BK101RY
D553 2SD1849-LS
C563 270P/500V
R571 5.6K/1W
R572 4.7K/2W
R573 5.6K/2W
R574 4.7K/2W
D557 KSA812-OIL
D564 RD91E8
R581 33K
R582 33K
R585 1K
R583 33K
R585 10K
D558 KSC1623-C1L
D563 KSC1623-C1L
C580 100/25V
R584 33K
R589 3.9K
C581 470/10V
D556 2SD1985-D
R543 12/2W
R588 12/2W
C578 0.018/400V
C585 6800P/1.6KV
D559 RS4FM4FL1
D560 RD91E8
LS53 FLBM332J
C579 0.5/25V
R586 27/1W
R587 47/1W
CO-4B
AFC PULSE
H. DEF
TS52 FBT PRLF34203F1
R511 6.8/5W
C588 100/160V
C574 330/10V
D558 RGP10J
R5001 0.47/5W
R5002 12/7.5W
R575 39K
D525 RGP10J
D552 RGP10J
C569 12.2/160V
R591 18K
C570 0.1/50V
R593 6.8K
C571 1/250V
R519 88.7K/1% 0.25W
R580 10K
R592 100
D530 KSC1623-C1L
R594 4.7K
R590 2.2K
R571 10KB
D563 RR165
C504 0.1/25V
H.V. ADJ
※ Sealed Control
(Please see the warning of item 3 on page 16 of this manual.)

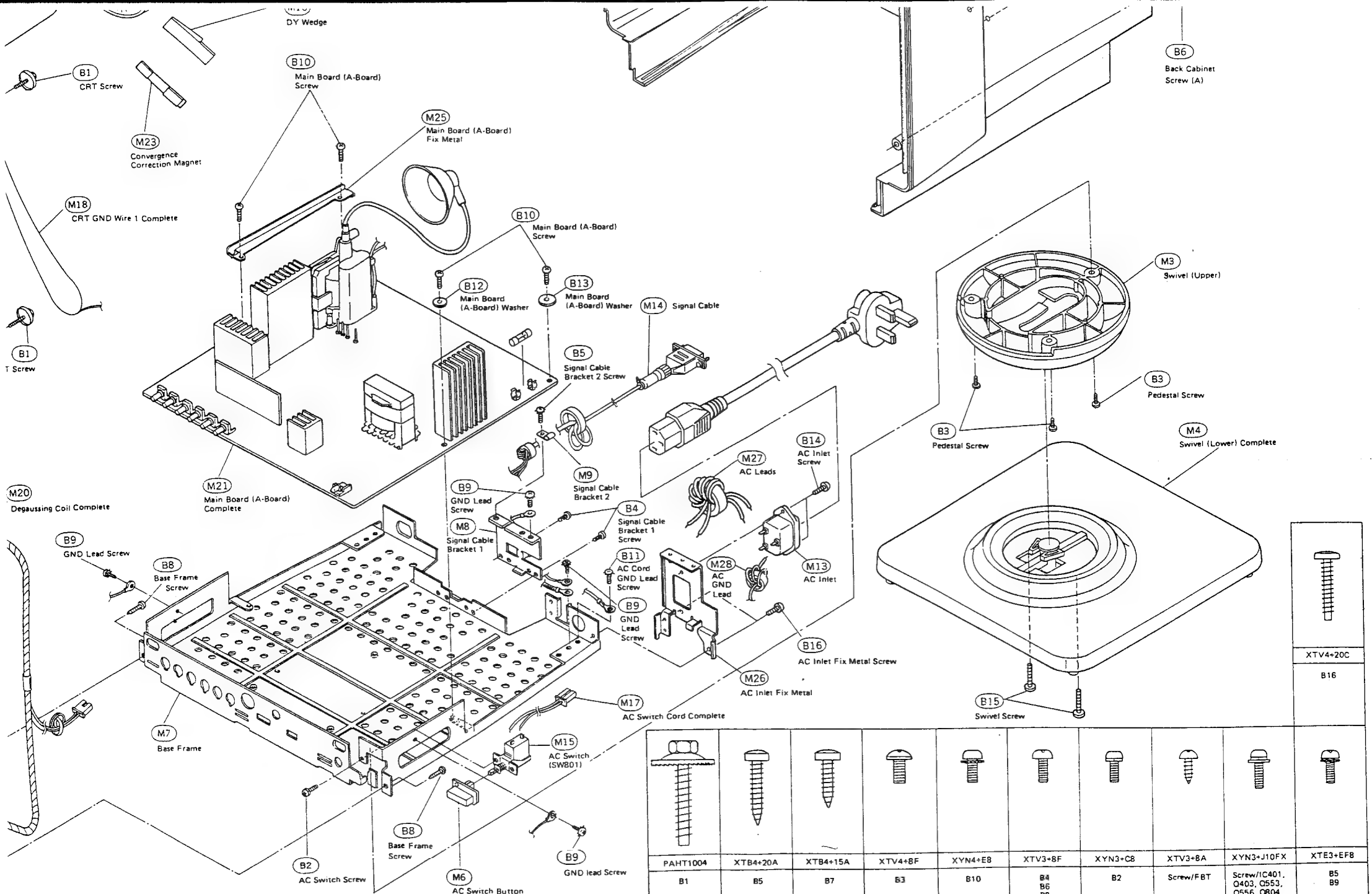
MECHANICAL PARTS LOCATION




M22
Neck Board (C-Board) Complete
M24
Shield Plate
M11
DY
M12
CY
M16
DY Wedge
M2
Back Cabinet Complete
B6
Back Cabinet Screw (A)
M29
Name Plate
B7
Back Cabinet Screw (B)
B6
Back Cabinet Screw (A)
B1
CRT Screw
M23
Convergence Correction Magnet
B10
Main Board (A-Board) Screw
M25
Main Board (A-Board) Fix Metal
M18
CRT GND Wire 1 Complete
B10
Main Board (A-Board) Screw
B12
Main Board (A-Board) Washer
B13
Main Board (A-Board) Washer
M14
Signal Cable
B5
Signal Cable Bracket 2 Screw
M21
Main Board (A-Board) Complete
M9
Signal Cable Bracket 2
B9
GND Lead Screw
M8
Signal Cable Bracket 1
B4
Signal Cable Bracket 1 Screw
B11
AC Cord
M28
M13
M27
AC Leads
B14
AC Inlet Screw
M3
Swivel (Upper)
B3
Pedestal Screw
B3
Pedestal Screw
M4
Swivel (Lower) Complete
B9
GND Lead Screw



PAHT1004	XTB4+20A	XTB4+15A	XTV4+8F
B1	B5	B7	B3



PAHT1004	XTB4+20A	XTB4+15A	XTV4+8F	XYN4+E8	XTV3+8F	XYN3+C8	XTV3+8A	XYN3+J10FX	XTE3+EF8
B1	B5	B7	B3	B10	B4 B6 B8 B9	B2	Screw/FBT	Screw/IC401, Q403, Q553, Q556, Q804, Q807, Q3504, Q3505, Q3506	B5 B9

XTV4+20C
B16

REPLACEMENT PARTS LIST

Important Safety Notice

Components identified by shaded area have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Warning

After servicing R577 (H.V. ADJUST), cover the ocntrol volume with UL tube and fill up silicon rubber in it so as the volume is not turned.

RESISTOR

PART NAME & DESCRIPTION			
TYPE		ALLOWANCE	
C	Carbon	F	± 1%
F	Fuse	J	± 5%
M	Metal Oxide	K	± 10%
S	Solid	M	± 20%
W	Wire Wound	G	± 2%

	Part No.		Description		
Example:	ERD25TJ104	Ⓒ	100K	Ⓙ	1/4W

CAPACITOR

PART NAME & DESCRIPTION			
TYPE		ALLOWANCE	
C	Ceramic	C	± 0.25pF
E	Electrolytic	D	± 0.5pF
P	Polyester	F	± 1pF
S	Styrol	J	± 5%
T	Tantalum	K	± 10%
PP	Polypropylene	L	± 15%
		M	± 20%
		P	+100% −0%
		Z	+80% −20%

	Part No.		Description		
Example:	ECKF1H103ZF	Ⓒ	0.01μF	Ⓩ	50V

Mechanical Parts

No.	Part No.	Description
		MECHANICAL PARTS
M 1	[illegible]	Front Cabinet Complete
M 2	[illegible]	Back Cabinet Complete
M 3	PABL357303A2	Swivel(Upper)
M 4	PABL355304A3	Swivel(Lower) Complete
M 5	PAKP35100504	Panel Complete
M 6	PABX3580500A	AC Switch Button
M 7	PAUA350500	Base Frame
M 8	PAUW35902-1	Signal Cable Bracket 1
M 9	PAUW30902	Signal Cable Bracket 2
M 10	PAWD1CT381H	CRT(ITC) ※
M 11	MST691477MG	DY
M 12	MEY-6977	CY
M 13	PAJS3A826	AC Inlet
M 14	PASX3214-2	Signal Cable
M 15	ESB99733V	AC Switch(SW801)
M 16	TMM17538	DY Wedge
M 17	PAXFJT41381G	AC Switch Cord Complete
M 18	PAXF3A12381G	CRT GND Wire 1 Complete
M 19	PAXF3A03C139	CRT GND Wire 2 Complete
M 20	PALK359058	Degaussing Coil Complete
M 21	PANP30936ZA	A-Board Complete
M 22	PANP31432ZA	C-Board Complete

No.	Part No.	Description
M 23	P6020012	Conver. Correction Magnet
M 24	PAUC35507	Shield Plate
M 25	PAUX37404	A-Board Fix Metal
M 26	PAUW35905	AC Inlet Fix Metal
M 27	PAXFWEC1381G	AC Leads
M 28	PAXFJEC1381G	AC GND Lead
M 29	PABM375020	Name Plate
B 1	PAHT1004	CRT Screw
B 2	XYN3+C8	AC Switch Screw
B 3	XTV4+8F	Screw/Pedestal
B 4	XTV3+8F	Screw/Cable Bracket 1
B 5	XYE3+ER8	Screw/Cable Bracket 2
B 6	XTB4+20A	Screw(A)/Back Cabinet
B 7	XTV3+8F	Screw(B)/Back Cabinet
B 8	XTB4+15A	Screw/Base Frame
B 9	XYE3+ER8	Screw/GND Lead
B 10	XTV3+8F	Screw/Main Board(A-Board)
B 11	XYN4+E8	Screw/AC Cord GND Lead
B 12	XWG3F10	Washer/MainBoard(A-Board)
B 13	XWG3F13	Washer/MainBoard(A-Board)
B 14	XTV3+8F	Screw/AC Inlet
B 15	XTV4+20C	Screw/Swivel
B 16	XTV3+8F	Screw/AC Inlet Fix Metal

※ CRT is supplied as ITC (CRT with DY and CY)

Main Board (A-Board)

No.	Part No.	Description
	RESISTORS	
R 408	EVND1AA03B14	Sub V-Size 10KohmB
R 410	ERJ8GEYJ393	C 39Kohm, J, 1/8W
R 412	ERDS2TJ273	C 27Kohm, J, 1/4W
R 414	ERDS2TJ682	C 6.8Kohm, J, 1/4W
R 415	ERX1ANJP1R5S	M 1.5ohm, J, 1W
R 416	EVND1AA03B34	V-Lin. 30KohmB
R 418	ERDS2TJ223	C 22Kohm, J, 1/4W
R 419	ERG1ANJP271S	M 270ohm, J, 1W
R 420	ERDS2TJ122	C 1.2Kohm, J, 1/4W
R 423	ERG2ANJ270	M 27ohm, J, 2W
R 424	ERG2ANJ820	M 82ohm, J, 2W
R 425	ERG2ANJ680	M 68ohm, J, 2W
R 427	ERDS2TJ470	C 47ohm, J, 1/4W
R 428	ERJ8GEYJ102	C 1Kohm, J, 1/8W
R 433	ERDS2TJ153	C 15Kohm, J, 1/4W
R 440	ERJ8GEYJ101	C 100ohm, J, 1/8W
R 444	EVUE30M20A24	V. Center 20KohmA
R 445	EVUE30M20C24	V. Size 20KohmC
R 456	EVND1AA03B54	Pincushion 50KohmB
R 464	ERG14AJ560P	F 56ohm, J, 1/4W
R 496	ERDS2TJ103	C 10Kohm, J, 1/4W
R 502	EVND4AA00B24	H.H High 20KohmB
R 507	ERDS2TJ222	C 2.2Kohm, J, 1/4W
R 511	ERF5ZK6R8	W 6.8ohm, K, 5W
R 512	EVND1AA03B23	H. Size Pre 2KohmB
R 514	EVUE30M20B23	H. Size 2KohmB
R 515	EVUE30M20B14	H. Center 10KohmB
R 519	EROS2CKF8872	M 88.7Kohm, F, 1/4W
R 521	ERG1ANJP221S	M 220ohm, J, 1W
R 525	EVND4AA00B23	H.H Low 2KohmB
R 534	ERG14AJ4R7P	F 4.7ohm, J, 1/4W
R 538	ERDS1TJ391	C 390ohm, J, 1/2W
R 543	ERG2ANJ120H	M 12ohm, J, 2W
R 545	ERDS2TJ682	C 6.8Kohm, J, 1/4W
R 554	ERG14AJ470P	F 47ohm, J, 1/4W
R 566	ERJ8ENF2200	C 220ohm, F, 1/8W
R 567	ERJ8ENF2000	C 200ohm, F, 1/8W
R 571	ERG1ANJP682S	M 6.8Kohm, J, 1W
R 572	ERG2ANJ472	M 4.7Kohm, J, 2W
R 573	ERG2ANJ562	M 5.6Kohm, J, 2W
R 574	ERG2ANJ472	M 4.7Kohm, J, 2W
R 575	ERDS2TJ393	C 39Kohm, J, 1/4W
R 576	ERO25CKF2203	M 220Kohm, F, 1/4W
R 577	EVND3AA03B14	1kV AdJ. 10KohmB
R 579	ERG1SJ102P	M 1Kohm, J, 1W
R 580	ERJ8GEYJ103	C 10Kohm, J, 1/8W
R 581	ERJ8GEYJ333	C 33Kohm, J, 1/8W
R 582	ERJ8GEYJ333	C 33Kohm, J, 1/8W
R 583	ERJ8GEYJ333	C 33Kohm, J, 1/8W
R 584	ERJ8GEYJ333	C 33Kohm, J, 1/8W
R 585	ERDS2TJ103	C 10Kohm, J, 1/4W

No.	Part No.	Description
R 586	ERG1ANJP270S	M 27ohm, J, 1W
R 587	ERG1SJ470P	M 47ohm, J, 1W
R 588	ERG2ANJ120H	M 12ohm, J, 2W
R 589	ERDS2TJ392	C 3.9Kohm, J, 1/4W
R 590	ERJ8GEYJ222	C 2.2Kohm, J, 1/8W
R 591	ERDS2TJ183	C 18Kohm, J, 1/4W
R 592	ERJ8GEYJ101	C 100ohm, J, 1/8W
R 593	ERDS2TJ682	C 6.8Kohm, J, 1/4W
R 594	ERJ8GEYJ472	C 4.7Kohm, J, 1/8W
R 595	ERJ8GEYJ102	C 1Kohm, J, 1/8W
R 597	ERDS2TJ222	C 2.2Kohm, J, 1/4W
R 801	ERF7ZK1R8	W 1.8ohm, K, 7W
R 802	ERG3ANJ104	M 100Kohm, J, 3W
R 803	ERG3ANJ104	M 100Kohm, J, 3W
R 804	ERDS1TJ824	C 820Kohm, J, 1/2W
R 805	ERDS1TJ563	C 56Kohm, J, 1/2W
R 806	ERDS1TJ683	C 68Kohm, J, 1/2W
R 807	ERJ8GEYJ222	C 2.2Kohm, J, 1/8W
R 808	ERJ8ENF6981	C 6.98Kohm, F, 1/8W
R 809	ERJ8ENF8201	C 8.20Kohm, F, 1/8W
R 810	ERJ8ENF2202	C 22.0Kohm, F, 1/8W
R 811	ERJ8ENF1003	C 100Kohm, F, 1/8W
R 812	ERJ8ENF1802	C 18.0Kohm, F, 1/8W
R 813	ERJ8GEYJ223	C 22Kohm, J, 1/8W
R 814	ERJ8GEYJ103	C 10Kohm, J, 1/8W
R 815	ERJ8GEYJ334	C 330Kohm, J, 1/8W
R 816	ERJ8GEYJ122	C 1.2Kohm, J, 1/8W
R 817	ERJ8GEYJ103	C 10Kohm, J, 1/8W
R 818	ERJ8GEYJ271	C 270ohm, J, 1/8W
R 819	ERDS1TJ271	C 270ohm, J, 1/2W
R 820	ERJ8GEYJ272	C 2.7Kohm, J, 1/8W
R 821	ERJ8GEYJ680	C 68ohm, J, 1/8W
R 822	ERD25FJ683	C 68Kohm, J, 1/4W
R 823	ERDS2TJ102	C 1Kohm, J, 1/4W
R 824	ERG2ANJ473H	M 47Kohm, J, 2W
R 830	ERJ8GEYJ151	C 150ohm, J, 1/8W
R 831	ERDS1TJ824	C 820Kohm, J, 1/2W
R 833	ERJ8GEYJ222	C 2.2Kohm, J, 1/8W
R 834	ERJ8GEYJ392	C 3.9Kohm, J, 1/8W
R 835	ERG3ANJ104	M 100Kohm, J, 3W
R 836	ERJ8GEYJ102	C 1Kohm, J, 1/8W
R 837	ERG3ANJ104	M 100Kohm, J, 3W
R 838	ERDS1TJ683	C 68Kohm, J, 1/2W
R 839	ERG12YJ154	S 150Kohm, J, 2W
R 840	ERG2ANJ333H	M 33Kohm, J, 2W
R 841	ERJ8GEYJ223	C 22Kohm, J, 1/8W
R 842	ERJ8GEYJ472	C 4.7Kohm, J, 1/8W
R 844	ERJ8GEYJ101	C 100ohm, J, 1/8W

No.	Part No.	Description
R 845	ERJ8GEYJ182	C 1.8Kohm, J, 1/8W
R 849	ERJ8GEYJ102	C 1Kohm, J, 1/8W
R 850	ERJ8GEYJ223	C 22Kohm, J, 1/8W
R 851	ERJ8GEYJ103	C 10Kohm, J, 1/8W
R 855	ERDS2TJ560	C 56ohm, J, 1/4W
R 856	ERDS1TJ332	C 3.3Kohm, J, 1/2W
R 857	ERDS1TJ103	C 10Kohm, J, 1/2W
R 858	ERG2ANJ183H	M 18Kohm, J, 2W
R 859	ERG2ANJ153H	M 15Kohm, J, 2W
R 860	ERDS2TJ472	C 4.7Kohm, J, 1/4W
R 861	ERG2ANJ153H	M 15Kohm, J, 2W
R 862	ERG2ANJ183H	M 18Kohm, J, 2W
R 864	ERG2ANJ470H	M 47ohm, J, 2W
R 865	ERG2ANJ560H	M 56ohm, J, 2W
R 868	ERDS2TJ222	C 2.2Kohm, J, 1/4W
R 872	ERDS1TJ471	C 470ohm, J, 1/2W
R 875	ERDS1TJ563	C 56Kohm, J, 1/2W
R 876	ERG1SJ472P	M 4.7Kohm, J, 1W
R 877	ERDS2TJ331	C 330ohm, J, 1/4W
R3114	ERDS1TJ821	C 820ohm, J, 1/2W
R3115	EVUE20M20B14	Contrast 10KohmB
R3116	EVUE20M20B14	Bright 10KohmB
R3117	ERJ8GEYJ682	C 6.8Kohm, J, 1/8W
R3118	ERJ8GEYJ152	C 1.5Kohm, J, 1/8W
R3123	ERDS2TJ562	C 5.6Kohm, J, 1/4W
R3124	EVND1AA03B24	Sub Contrast 20KohmB
R3125	ERDS2TJ563	C 56Kohm, J, 1/4W
R3126	EVND1AA03B24	Sub Bright 20KohmB
R3127	ERDS2TJ103	C 10Kohm, J, 1/4W
R3128	ERDS2TJ223	C 22Kohm, J, 1/4W
R3133	ERDS2TJ333	C 33Kohm, J, 1/4W
R4022	ERJ8GEYJ103	C 10Kohm, J, 1/8W
R4023	ERJ8GEYJ103	C 10Kohm, J, 1/8W
R4024	ERDS2TJ222	C 2.2Kohm, J, 1/4W
R4025	ERJ8GEYJ223	C 22Kohm, J, 1/8W
R4026	ERJ8GEYJ222	C 2.2Kohm, J, 1/8W
R4060	EVND1AA03B13	V.Center Pre. 1KohmB
R5001	ERQ12HKR47P	F 0.47ohm, K, 1/2W
R5002	ERQ14AJ120P	F 12ohm, J, 1/4W
R5015	EVND1AA03B14	H.Center Pre.10KohmB
	CAPACITORS	
C 403	ECEA1CU331	E 330uF, 16V
C 404	ECQV1H105JZ	P 1uF, J, 50V
C 405	ECEA1VU471	E 470uF, 35V
C 406	ECEA1VU101	E 100uF, 35V
C 407	ECUX1H120JCM	C 12pF, J, 50V
C 408	ECUX1H103ZFM	C 0.01uF, Z, 50V
C 409	ECEA1EGE102	E 1000uF, 25V
C 410	ECEA1HGE2R2	E 2.2uF, 50V
C 413	ECUX1H271KBM	C 270pF, K, 50V
C 431	ECQM1H333JV	P 0.033uF, J, 50V
C 438	ECUX1H070CCM	C 7pF, C, 50V
C 451	ECEA0JU101	E 100uF, 6.3V

No.	Part No.	Description
C 452	ECEA1CU470	E 47uF, 16V
C 453	ECEA1CU220	E 22uF, 16V
C 455	ECEA1AN220S	E 22uF, 10V
C 456	ECEA1CU220	E 22uF, 16V
C 466	ECUX1H102KBM	C 1000pF, K, 50V
C 467	ECEA1VU471	E 470uF, 35V
C 504	ECUX1E104ZFM	C 0.1uF, Z, 25V
C 528	ECEA2CG4R7S	E 4.7uF, 160V
C 552	ECQM1H182JV	P 1800pF, J, 50V
C 553	ECQM1H102KV	P 1000pF, K, 50V
C 554	ECQM1H222KV	P 2200pF, K, 50V
C 555	ECEA1CU100	E 10uF, 16V
C 556	ECEA1HU2R2	E 2.2uF, 50V
C 558	ECQK1222JZ	P 2200pF, J, 100V
C 559	ECEA1CU221	E 220uF, 16V
C 560	ECEA1VU100	E 10uF, 35V
C 563	ECKD2H271KB2	C 270pF, K, 500V
C 564	PACWF2H105JN	P 1uF, 200V
C 565	PAC16B3CJ662	P 6600pF, J, 1.6KV
C 568	ECEA2CU101	E 100uF, 160V
C 569	ECEA2CU2R2	E 2.2uF, 160V
C 570	ECQM1H104KV	P 0.1uF, K, 50V
C 571	ECEA2EU010	E 1uF, 250V
C 572	ECEA1CU100	E 10uF, 16V
C 574	ECEA1AU331	E 330uF, 10V
C 576	ECQV1H154JZ	P 0.15uF, J, 50V
C 577	ECKD2H391KB2	C 390pF, K, 500V
C 578	PACDTW4183J	P 0.018uF, J, 400V
C 579	ECEA1EW8R5Z	E 8.5uF, 25V
C 580	ECEA1EU101	E 100uF, 25V
C 581	ECEA1AU471	E 470uF, 10V
C 801	ECKDRS332ME	C 3300pF, M, 250VAC
C 802	ECKDRS101MB	C 100pF, M, 250VAC
C 803	ECQE2A474MVB	PP 0.47uF, 250VAC
C 805	ECKDRS101MB	C 100pF, M, 250VAC
C 808	ECUX1H102JCM	C 1000pF, J, 50V
C 809	ECOS2GP471DX	E 470pF, 400V
C 810	ECEA1VU470	E 47uF, 35V
C 811	ECUX1E104ZFM	C 0.1uF, Z, 25V
C 812	ECUX1H101JCM	C 100pF, J, 50V
C 813	ECEA1CU100	E 10uF, 16V
C 815	ECUX1H103ZFM	C 0.01uF, Z, 50V
C 816	ECEA2VU4R7	E 4.7uF, 350V
C 817	ECEA1VU101	E 100uF, 35V
C 818	ECEA1VU100	E 10uF, 35V
C 821	ECUX1H682KBM	C 6800pF, K, 50V
C 844	ECUX1H103ZFM	C 0.01uF, Z, 50V
C 851	ECKD2H102KB5	C 1000pF, K, 500V
C 852	ECEA1EU102	E 1000uF, 25V
C 854	ECKD2H101KB2	C 100pF, K, 500V
C 855	ECEA2CU330	E 33uF, 160V
C 857	ECKD2H102KB5	C 1000pF, K, 500V
C 858	ECEA1VU471	E 470uF, 35V
C 860	ECEA1CU101	E 100uF, 16V

No.	Part No.	Description
C 861	ECUX1H150JCM	C 15pF, J, 50V
C 862	ECUX1H101JCM	C 100pF, J, 50V
C 864	ECEA2CU221W	E 220uF, 160V
C 870	ECEA2CU4R7	E 4.7uF, 160V
C 882	ECKDRS222ME	C 2200pF, M, 250VAC
C 883	ECKDRS222ME	C 2200pF, M, 250VAC
C 886	ECEA2CU100	E 10uF, 160V
C 887	ECKD2H682KB5	C 6800pF, K, 500V
C4001	ECEA1HU010	E 1uF, 50V
C4021	ECUX1H103KBM	C 0.01uF, K, 50V
C4022	ECUX1H101JCM	C 100pF, J, 50V
C5004	ECEA1HU4R7	E 4.7uF, 50V
C5006	ECEA0JU470	E 47uF, 6.3V
C5007	ECEA0JU330	E 33uF, 6.3V
C5008	ECCF1H101JC5	C 100pF, J, 50V
C5009	ECCF1H101JC5	C 100pF, J, 50V
C5011	ECEA1CU100	E 10uF, 16V
C5015	ECEA0JU331	E 330uF, 6.3V
C5050	ECEA1HU2R2	E 2.2uF, 50V
C5100	ECUX1E104ZFM	C 0.1uF, Z, 25V
	DIODES	
D 401	ERTD2ZGL102S	Thermistor
D 402	EM1Z	Diode
D 403	MA167	Diode
D 404	MA165	Diode
D 405	MA165	Diode
D 406	TVSRD5.1ESB1	Zener Diode Vz=5.1V
D 416	TVSRD5.6ESB1	Zener Diode Vz=5.6V
D 417	MA165	Diode
D 525	TVSRGP10J	Diode
D 552	TVSRGP10J	Diode
D 553	TVSRGP10J	Diode
D 555	TVSRD12EBM	Zener Diode Vz=12V
D 556	TVSRGP10J	Diode
D 557	MA165	Diode
D 558	TVSRD20EB2	Zener Diode Vz=20V
D 559	TVSRS4FSLFL1	Diode
D 560	TVSRG4	Diode
D 563	MA165	Diode
D 564	TVSRD91EB	Zener Diode Vz=91V
D 801	D2SB60F1	Rectifier
D 802	PART35003	Posistor
D 803	TVSRD5.1EB2	Zener Diode Vz=5.1V
D 804	TVSRD16EB2	Zener Diode Vz=16V
D 805	TVSRGP10J	Diode
D 806	TVSRD5.1EB2	Zener Diode Vz=5.1V
D 807	TVSRD24EB1	Zener Diode Vz=24V
D 808	TVSRGP10J	Diode
D 809	RG1C	Diode
D 810	TVSRGP10J	Diode
D 811	TVSRD13EB2	Zener Diode Vz=13V
D 812	MA165	Diode

No.	Part No.	Description
D 813	MA165	Diode
D 851	PAVD11DF2	Diode
D 852	TVSRG2A	Diode
D 853	TVSRG2	Diode
D 856	TVSRG4ALFL1	Diode
D 862	TVSRD5.1EB2	Zener Diode Vz=5.1V
D 863	MA165	Diode
D 864	TVSRD18EB3	Zener Diode Vz=18V
D3014	LN31CPHL-UGS	LED
D3016	TVS1S2076	Diode
D3027	TVSRD3.6EB2	Zener Diode Vz=3.6V
D3028	MA27T-A	Diode
D5003	TVSRD5.1EB2	Zener Diode Vz=5.1V
	INTEGRATED CIRCUITS	
IC 401	LA7836	V. Out
IC 504	TVSUPC78M12H	+12V Regulator
IC 801	LM339N	Comparator
IC5002	PAAH0003	Hybrid IC
	COILS	
L 551	[illegible]5L749	Linearity Coil
L 552	[illegible]18B022	Choke Coil
L 553	FL9H33[illegible]	Choke Coil
L 801	[illegible]	Line Filter
L 804	TSC928-4	Ferrite Choke
L 805	ETU25K6C	Line Filter
L 852	FL9H221K20	Choke Coil
L 858	FL9H221K20	Choke Coil
L 860	TSK1008	Ferrite Choke
L3001	PELQLHL6221K	Choke Coil
	TRANSISTORS	
Q 403	2SD1985-P	V. Center
Q 405	KSC1623-C1L	V. Size
Q 406	KSA812-D1L	V. Sync
Q 407	KSC1623-C1L	V. Sync
Q 530	KSC1623-C1L	High Voltage
Q 552	2SC2688	H. Drive
Q 553	2SD1849-LS	H. Output
Q 556	2SD1985-Q	H. Size
Q 557	KSA812-D1L	X-Ray Protection
Q 558	KSC1623-C1L	X-Ray Protection
Q 559	KSC1623-C1L	X-Ray Protection
Q 801	2SK1074	Power Output
Q 802	KSC1623-C1L	Drive/Q801
Q 803	KSA812-D1L	Drive/Q801
Q 805	KSA812-D1L	FBT Trigger
Q 808	KSC1623-C1L	Soft Start
Q 809	KSA812-D1L	Over Voltage Protection
Q 811	KSC1623-C1L	B+ Adjust
Q 851	MPSA43C	H. Deflection B+
Q 852	2SD1277-Q	H. Deflection B+
Q 853	MPSA43C	H. Deflection B+
Q3047	KSC1623-C1L	Sub-Contrast

No.	Part No.	Description
Q3048	KSC1623-C1L	Sub-Bright
	TRANSFORMERS	
T 551	ETH19K101AY	H. Drive Trans.
	OTHERS	
RL 801	PASE30801	Relay
X5001	PAAF10001	Crystal Oscillator(7.08M)
A 41	PAXAJE02C138	1P GND Wire
A 108	PAXAJE31381G	1P GND Wire
A 115	PAXAJT19C139	1P Coupler/CO-7C
A11A16	PAXAJT21381G	6P-8P Coupler/CO-1C
A21A29	PAXAJT11381G	9P Coupler/CO-3C
A-1	TMM15412-1	Clamper
A-4	PAMM33402	Spacer
A-5	PAMM33402	Spacer
	XTV3+8A	Screw/FBT
	TMW77709	LED Holder(D3014)
	PAUC35621-1	Heat Sink/IC401, Q403
	XYN3+J10FX	Screw/IC401, Q403
	PAUC35615-2	Heat Sink/Q553,Q556
	XYN3+J10FX	Screw/Q553,Q556
	PAUC35616-2	Heat Sink/Q801
	XYN3+J10FX	Screw/Q801
	PAUC30614	Heat Sink/Q852
	XYN3+J10FX	Screw/Q852
CO-4A	PAXAJT6C1391	Raster Center(A) Coupler
CO-4A	PAXAJT7C1391	Raster Center(B) Coupler
CO-4A	PAXAJT8C1391	Raster Center(C) Coupler
CO-4A	PAXAJT9C1391	Raster Center(D) Coupler

Neck Board (C-Board)

No.	Part No.	Description
	RESISTORS	
R3501	EVN61AA00B52	R. Drive 500ohmB
R3503	EVN61AA00B52	B. Drive 500ohmB
R3504	ERDS2TJ101	C 100ohm, J, 1/4W
R3505	ERDS2TJ101	C 100ohm, J, 1/4W
R3506	ERDS2TJ101	C 100ohm, J, 1/4W
R3507	ERDS2TJ562	C 5.6Kohm, J, 1/4W
R3508	ERDS2TJ562	C 5.6Kohm, J, 1/4W
R3509	ERDS2TJ562	C 5.6Kohm, J, 1/4W
R3510	EVN61AA00B14	R. Cut Off 10KohmB
R3511	EVN61AA00B14	G. Cut Off 10KohmB
R3512	EVN61AA00B14	B. Cut Off 10KohmB
R3516	ERG1ANJP560S	M 56ohm, J, 1W
R3517	ERG1ANJP560S	M 56ohm, J, 1W
R3518	ERG1ANJP560S	M 56ohm, J, 1W
R3519	ERG5ZJ152	M 1.5Kohm, J, 5W
R3520	ERG5ZJ152	M 1.5Kohm, J, 5W
R3521	ERG5ZJ152	M 1.5Kohm, J, 5W
R3522	ERDS2TJ152	C 1.5Kohm, J, 1/4W
R3523	ERDS2TJ152	C 1.5Kohm, J, 1/4W
R3524	ERDS2TJ152	C 1.5Kohm, J, 1/4W
R3525	ERC14GK220	S 22ohm, K, 1/4W
R3526	ERC14GK220	S 22ohm, K, 1/4W
R3527	ERC14GK220	S 22ohm, K, 1/4W
R3528	ERC14GK103	S 10Kohm, K, 1/4W
R3530	ERDS2TJ560	C 56ohm, J, 1/4W
R3531	ERDS2TJ560	C 56ohm, J, 1/4W
R3532	ERDS2TJ560	C 56ohm, J, 1/4W
R3533	ERJ8GEYJ102	C 1Kohm, J, 1/8W
R3534	ERJ8GEYJ102	C 1Kohm, J, 1/8W
R3535	ERJ8GEYJ102	C 1Kohm, J, 1/8W
R3536	ERJ8GEYJ181	C 180ohm, J, 1/8W
R3537	ERJ8GEYJ181	C 180ohm, J, 1/8W
R3538	ERJ8GEYJ181	C 180ohm, J, 1/8W
R3539	ERJ8GEYJ101	C 100ohm, J, 1/8W
R3540	ERJ8GEYJ331	C 330ohm, J, 1/8W
R3542	ERDS2TJ220	C 22ohm, J, 1/4W
R3544	ERDS2TJ220	C 22ohm, J, 1/4W
R3546	ERDS2TJ220	C 22ohm, J, 1/4W
R3550	ERDS2TJ104	C 100Kohm, J, 1/4W
R3551	ERDS2TJ104	C 100Kohm, J, 1/4W
R3552	ERDS2TJ104	C 100Kohm, J, 1/4W
R3563	ERDS2TJ821	C 820ohm, J, 1/4W
R3566	ERDS2TJ682	C 6.8Kohm, J, 1/4W
R3567	ERJ8GEYJ102	C 1Kohm, J, 1/8W
R3568	ERJ8GEYJ102	C 1Kohm, J, 1/8W
R3569	ERJ8GEYJ102	C 1Kohm, J, 1/8W
R3570	ERDS1TJ122	C 1.2Kohm, J, 1/2W
R3571	ERDS1TJ122	C 1.2Kohm, J, 1/2W
R3572	ERDS1TJ122	C 1.2Kohm, J, 1/2W
R3573	ERDS2TJ122	C 1.2Kohm, J, 1/4W
R3574	ERDS2TJ122	C 1.2Kohm, J, 1/4W

No.	Part No.	Description
R3575	ERDS2TJ122	C 1.2Kohm, J, 1/4W
R3576	ERDS2TJ152	C 1.5Kohm, J, 1/4W
R3577	ERDS2TJ152	C 1.5Kohm, J, 1/4W
R3578	ERDS2TJ152	C 1.5Kohm, J, 1/4W
R3579	ERDS2TJ472	C 4.7Kohm, J, 1/4W
R3580	EVN61AA00B53	Video Bias 5KohmB
R3581	ERDS2TJ471	C 470ohm, J, 1/4W
R3582	ERJ8GEYJ750	C 75ohm, J, 1/8W
R3583	ERJ8GEYJ750	C 75ohm, J, 1/8W
R3584	ERJ8GEYJ750	C 75ohm, J, 1/8W
R3585	ERJ8GEYJ470	C 47ohm, J, 1/8W
R3586	ERJ8GEYJ470	C 47ohm, J, 1/8W
R3587	ERJ8GEYJ470	C 47ohm, J, 1/8W
R3588	ERJ8GEYJ221	C 220ohm, J, 1/8W
R3589	ERDS2TJ221	C 220ohm, J, 1/4W
R3590	ERJ8GEYJ391	C 390ohm, J, 1/8W
R3591	ERJ8GEYJ102	C 1Kohm, J, 1/8W
[illegible]		

CAPACITORS

C3501	ECUX1H390JCM	C 39pF, J, 50V
C3502	ECUX1H390JCM	C 39pF, J, 50V
C3503	ECUX1H390JCM	C 39pF, J, 50V
C3507	ECEA2CU330	E 33uF, 160V
C3508	ECKD3D681KBN	C 680pF, K, 2KV
C3509	ECKD3D102KBN	C 1000pF, K, 2KV
C3517	ECKF1H331KB5	C 330pF, K, 50V
C3519	ECKF1H331KB5	C 330pF, K, 50V
C3521	ECKF1H331KB5	C 330pF, K, 50V
C3522	ECEA2AGE010	E 1uF, 100V
C3523	ECEA2AU010	E 1uF, 100V
C3524	ECEA2AU010	E 1uF, 100V
C3528	ECKF1H101KB5	C 100pF, K, 50V
C3529	ECKF1H103ZF5	C 0.01uF, Z, 50V
C3530	ECUX1H103KBM	C 0.01uF, K, 50V
C3531	ECUX1H103KBM	C 0.01uF, K, 50V
C3532	ECUX1H103KBM	C 0.01uF, K, 50V
C3533	ECEA1HU2R2	E 2.2uF, 50V
C3534	ECEA1HUR47	E 0.47uF, 50V
C3535	ECEA1CU221	E 220uF, 16V
C3537	ECKF1H103ZF5	C 0.01uF, Z, 50V
C3538	ECKF1H103ZF5	C 0.01uF, Z, 50V
C3539	ECKF1H103ZF5	C 0.01uF, Z, 50V
C3540	ECUX1H121JCM	C 120pF, J, 50V
C3544	ECUX1E104ZFM	C 0.1uF, Z, 25V

DIODES

D3501	TVSRD8.2EB1	Zener Diode Vz=8.2V

INTEGRATED CIRCUITS

IC3501	CXA1044P	Analog Amp.

COILS

L3501	TLT120K991R	Peaking Coil
L3502	TLT120K991R	Peaking Coil
L3503	TLT120K991R	Peaking Coil
L3504	TLT018K991R	Peaking Coil
L3505	TLT018K991R	Peaking Coil
L3506	TLT018K991R	Peaking Coil
L3507	TSK1008	Beaded Core
L3508	TSK1008	Beaded Core
L3509	TSK1008	Beaded Core

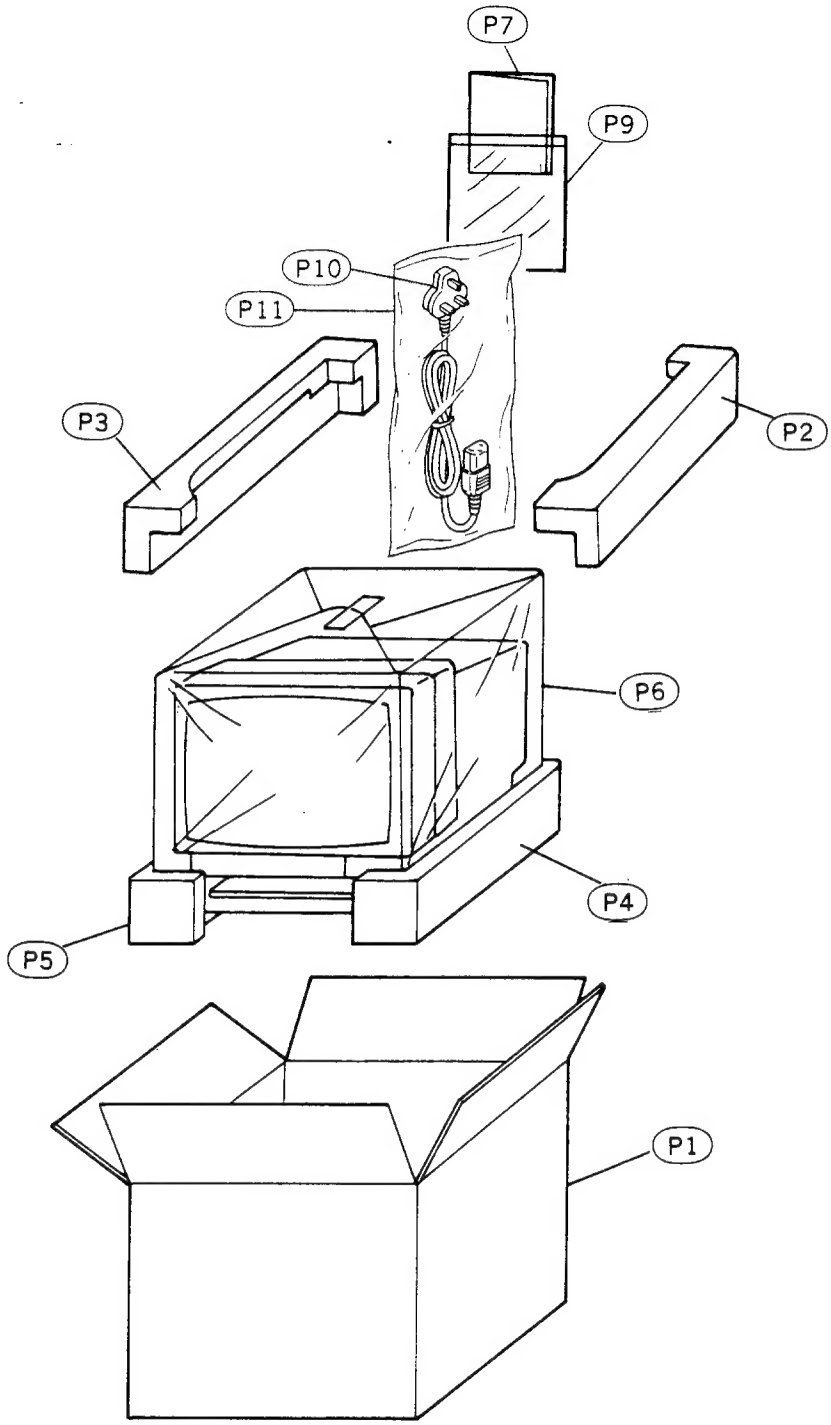
TRANSISTORS

Q3501	TVS2SC2901K	R. Drive
Q3502	TVS2SC2901K	G. Drive
Q3503	TVS2SC2901K	B. Drive
Q3504	2SC4001	R. Output
Q3505	2SC4001	G. Output
Q3506	2SC4001	B. Output
Q3511	MPSA43C	R. Cut Off
Q3512	MPSA43C	G. Cut Off
Q3513	MPSA43C	B. Cut Off

OTHERS

S3501	PAAG10001	Spark Gap
S3502	XANT141	Neon Lamp
N3501	XANT322	Neon Lamp
N3502	XANT141	Neon Lamp
N3503	XANT141	Neon Lamp
N3504	XANT141	Neon Lamp
CO-1C	TJS169020	8P Connector
CO-2C	TJS169330	9P Connector
CO-3C	TJS169331	9P Connector
	PAXAJE09C139	1P GND Braided Wire
	PAUC35506	Shield Case
	TJS1A5050	CRT Socket
	PAMY3082Z	Heat Sink/Q3504
	XYN3+J10FX	Screw/Q3504
	PAMY3082Z	Heat Sink/Q3505
	XYN3+J10FX	Screw/Q3505
	PAMY3082Z	Heat Sink/Q3506
	XYN3+J10FX	Screw/Q3506

Packing Parts



No.	Part No.	Description
	PACKING	
P 1	PAPC3510413	Packing Case
P 2	PAPD351006-1	Cushion(Upper R)
P 3	PAPD351007-1	Cushion(Upper L)
P 4	PAPD352006-2	Cushion(Bottom R)
P 5	PAPD352007-2	Cushion(Bottom L)
P 6	PAPE314005	Cover for Unit
P 7	PRMX1001Z0	Operating Instructions
P 9	PAPF8Z	Cover for O/I
P 10	PASX312E	AC Cord
P 11	PAQE3502	Cover for AC Cord